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NORTHWESTERN UNIVERSITY

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BULLETIN
OF THE
SCHOOL OF PHARMACY

1851

The next date for the admission of students is February 9, 1906

NORTHWESTERN UNIVERSITY BUILDING
LAKE AND DEARBORN STREETS, CHICAGO

Entered June 24, 1902, at Chicago, Illinois, as Second-Class Matter, under Act of Congress of July 16, 1894.

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*On leave of absence for one year in Europe.

BULLETIN
OF THE
SCHOOL OF PHARMACY
OF
NORTHWESTERN UNIVERSITY

DECEMBER, 1905

PROPOSITION TO ABOLISH THE BOARD OF PHARMACY OF ILLINOIS.

Dean F. M. Goodman of the Chicago College of Pharmacy delivered an address at the presidential installation exercises of the University of Illinois October 19th, an abstract of which is published in the November number of the Apothecary. Speaking for the Chicago College of Pharmacy, Dean Goodman is reported as saying:

"We are hoping to have this school justly recognized by the people as the State Board of Pharmacy. And pharmacists through the state, unless they are perfectly satisfied to continue their efforts to fill the ravenous maw of the state law—and this without benefit to themselves—must, as their only salvation, insist upon the recognition of this as the state school and the one through which the State law must be enforced."

Dean Goodman then proposes that the faculty of the Chicago College of Pharmacy shall conduct all examinations now held by the State Board of Pharmacy, and asserts that the diploma of his school should be accepted as satisfactory evidence of fitness for registration and license, while "all other applicants should be compelled to pass an examination by the same faculty." He says that "no man who has the least interest in pharmacal progress or in state progress will for a moment object to the matter being entirely under the control of the state institution. Under these conditions the standard could be raised," etc.

As one of the men who have an interest in "pharmacal" progress I must differ with Dean Goodman. The "ravenous maw" of the state law exacts five dollars per annum of the pharmacists, not "without benefit to themselves" but to defray the necessary expenses of the machinery by which the law is enforced, under the operation of which the pharmacists enjoy the exclusive right to practice pharmacy. I believe that this right is so valuable that pharmacists will not give it up. Dean Goodman himself evidently takes for granted that they must continue to possess it. If the legislature can be persuaded to appropriate the money required to defray the expenses of the enforcement of the pharmacy law out of the state treasury without requiring the druggists to pay a reasonable fee, it would doubtless be acceptable to the latter; but such a thing has never been done before, and it is not likely that it ever will be done, even if the Chicago College of Pharmacy should be so liberal as to undertake the functions of the Board of Pharmacy *at the expense of the people.*

As for the "state school of pharmacy," will Dean Goodman inform us how the state supports it? Has that school ever received a penny from the state treasury or the State University? Official reports do not say that it has.

One thing which the state school of pharmacy might well be expected to do is to increase its equipment and its educational requirements and courses of instruction until they shall have been made at least not greatly inferior to any other in Illinois, or to those of other state schools of pharmacy. One of the schools of pharmacy of Illinois publishes a plain statement of tangible concrete facts concerning its equipment and work—such a statement as any school may properly and easily make if it desires to give a substantial basis upon which a correct opinion may be founded. Facts are better than vague adjectives. (See pages 7 to 10 of this Bulletin.) Cannot the standard of the state school be raised without abolishing the state board of examiners? The legislature will never compel graduates of other schools of pharmacy, or of medicine, dentistry, or law, or graduates of any other professional or technical schools, to pass an examination before the respective faculties of the State University. That is an idle dream. But it is very amusing. OSCAR OLDBERG.

THE PHYSICIAN'S VITAL INTEREST IN PHARMACY.

Hundreds of years have passed since pharmacy became a distinct occupation, and during those centuries the scientific progress of the art of pharmacy has been very great. That progress is reflected by the pharmacopoeias of the whole world. Manufacturing pharmacists and chemists have profited by the advance in pharmaceutical and chemical knowledge. New drugs and medicines have been discovered and new methods devised or perfected by which old remedies have been improved and rendered more uniform and reliable.

Physicians must make full use of the progress in pharmacy if they do not wish to fall behind in their own profession.

It is too much to ask of any busy physician that he shall be also an up-to-date pharmacist, or that he shall be his own dispenser. The fact that some physicians do dispense their own prescriptions or furnish the medicines required by their own patients must be regarded as but a temporary and an altogether abnormal and unwholesome condition of things. It is bad for the physician himself because it is bad for his patients, and it impedes progress and discourages the pharmacist.

No practicing physician can successfully keep a sufficient supply or assortment of remedies in his own office, nor can he give proper attention to the remedies he does keep. Drugs and medicines deteriorate when not well taken care of, and many of the most valuable of all remedies are so unstable that they lose their virtues in a comparatively short time even when intelligently looked after. A busy physician cannot renew his stock frequently enough to enable him to have fresh supplies of sensitive preparations. And how can he foresee what his patients require, or judge intelligently of the supplies he buys?

Very few of the remedies of the pharmacopoeia can be handed out to patients without further modification. They must be treated in some way before they are ready for administration or application, or they must be combined with other substances. The compounding and dispensing must be done by a pharmacist possessing not only the special training and experience but all the necessary facilities for doing the work properly.

But the physician has a right to demand that the pharmacist shall be well enough educated to do his duty correctly. He is, therefore, vitally interested in good pharmaceutical education and should encourage it.

ALUMNI INTERESTS.

The prompt response to our letter requesting corrected addresses of graduates was extremely gratifying, and this opportunity is taken to thank one and all for their good wishes and pronounced interest in the welfare of pharmaceutical education and the prosperity of this School. This interest is mutual and reciprocal and our graduates are considered by us to be but in a higher class, taking the greater post graduate course of practical demonstration of the principles learned in this School. Were these students gathered in an assembly hall they would outnumber our present attendance almost ten to one, and but few of the number have as yet joined the silent majority.

It is pleasant to see the familiar signatures of former friends and satisfying to see that for the most part early prophesies of successful careers have been verified. Not all have clung to the original vocation. A surprisingly large number now place M. D. after their names, and it may be taken for granted that in no case have these men regretted the time spent in pharmacy or looked upon it other than as a valuable stepping stone to their present positions. A good majority of the men who have been out for five years are present proprietors of pharmacies and many of them are sending regularly their apprentices over the same road they traveled. Some few have dropped the original calling and are following pursuits more or less foreign to pharmacy, but even in such cases the time at school is never time wasted, for the pursuit of any study carried to successful conclusion is the kind of training to make successful men and the training is more important than the subjects studied. Take it all in all, the School and all who have gone from its classes may well be proud of the fruits of twenty years' growth. Our graduates are good men to know and they should look each other up wherever practicable.

It is not the purpose of this School to open an employment agency nor to guarantee positions for either graduates or students, but with the constantly increasing list of pharmacists who appreciate what a serious consideration of the subject signifies we are at all times in a position to "get good men together" as employers and employees. Mr. Oglesby (class '91) is now with us in charge of the dispensing laboratory, and he will make a special effort to place good men in good positions. If any of our graduates are dissatisfied with their present conditions or for any reason desire to make a change of place or locality and will communicate with Mr. Geo. D. Oglesby, it is quite probable that some assistance may be rendered.

The intention was at first to publish the corrected lists of graduates in this present issue of the Bulletin, but we found it to be impracticable, and the publication of such a directory is postponed for a short time until all are heard from.

THE SCHOOL OF PHARMACY
OF
NORTHWESTERN UNIVERSITY

Northwestern University was chartered by the State of Illinois in 1851.

The School of Pharmacy was established in 1886. It is a member of the American Conference of Pharmaceutical Faculties, and its graduates are given recognition under the pharmacy laws of New York and Pennsylvania, the only states in which graduation from formally recognized schools of pharmacy is demanded by law as a prerequisite to license to practice pharmacy.

Location.

This School is in Northwestern University Building, a seven-story edifice in the heart of the City of Chicago (corner of Lake and Dearborn Streets). Twenty-six rooms having a total floor space of about 27,000 square feet, including all of the fourth floor (160 x 180 feet) and two large rooms on the fifth floor, are used exclusively by the School of Pharmacy. The rental value of the quarters occupied by the School is estimated to be about $7,500 per annum.

Equipment.

The equipment, including furniture, fixtures, instruments, apparatus, books, museum specimens, drugs, chemicals and other materials in this School, for its exclusive use, are worth (December, 1905) over $26,000.

The Laboratories.

The School has seven laboratories used exclusively by its own classes. These laboratories have a total floor space of 10,780 square feet and are provided with over 300 individual work tables, enabling that number of students to be all at work at one time. These several laboratories are: 1, the Qualitative Chemical Laboratory; 2, the Quantitative Chemical Laboratory; 3, the Organic Chemical Laboratory; 4, the Laboratory for Botany, Microscopy and Pharmacognosy; 5, the Manufacturing Laboratory (Pharmaceutical Laboratory); 6, the Dispensing Laboratory; and 7, the Bacteriological Laboratory.

Lecture Rooms.

There are two lecture rooms exclusively used by the School of Pharmacy, one seating one hundred and eighty-four and the other ninety-six.

Students' Rooms.

Two students' rooms are provided—one for men and one for women.

Museum.

The museum contains over 2,000 specimens of drugs and other related products, including manufactured preparations and sickroom supplies usually sold by druggists, etc.

Library.

The library occupies about 648 square feet of floor space and contains about 1,000 bound volumes of the value of about $3,500. They include complete sets of Archiv der Pharmacie, the Proceedings of the American Pharmaceutical Association, and the British Pharmaceutical Journal; complete sets of Berichte der Chemischen Gesellschaft from 1868 to date, and of Chemisches Centralblatt from 1870 to date; and, complete from 1893 to date, the Berichte der Pharmaceutischen Gesellschaft, Zeitschrift f. Anorg. Chemie, Zeitschrift f. Anal. Chemie, Journal of the London Chemical Society, the Neueste Erfindungen u. Erfahrungen, Pharmaceutische Centralhalle, Repertoire de Pharmacie, etc. All the pharmacœpias of the world are also in the library.

The library is open to all students every week-day from 9 o'clock a. m. to 5 p. m., except on Saturdays, when it is closed at 1 o'clock.

Average Attendance.

The average annual attendance during the nineteen years from 1886 to 1905, inclusive, has been 215, counting no individual student more than once in any year. From twenty to twenty-five states are represented in the classes each year.

Alumni.

The degree of Graduate in Pharmacy has been conferred by this School upon 1,502 and the degree of Pharmaceutical Chemist upon 98 graduates.

Program of Work.

This School gives to every student a full program of instruction carefully prepared with the view to occupy his whole time to the best advantage. It is, in other words, conducted primarily for the benefit of students who desire to devote their whole time to their courses of study during the entire period of their college attendance, so as to accomplish the most satisfactory and substantial educational results in the customary time devoted to the courses in the colleges of pharmacy.

The regular program of work in this School requires the attendance of each student about 30 hours weekly.

Discontinuance of Special Program for Students Employed in Drug Stores.

Up to this year the School of Pharmacy of Northwestern University has, in common with many other such schools, provided a special program for students who desire to combine wage earning with their college attendance. From 10 to 20 per cent of the students have taken advantage of that special program. But the educational results have been so unsatisfactory that this plan will not be continued after this year.

Colleges of pharmacy in large cities are generally conducted on the assumption that the drug clerks in those cities wish to continue in their drug store employment while taking their college courses, and their program of instruction is accordingly so arranged as to require but three days' school attendance weekly, the remainder of the student's time being at the disposal of his employer. But while a course of 1,500 hours' instruction can be readily accomplished in 50 weeks with 30 hours' instruction weekly, it clearly requires 75 weeks if the weekly program of work is only 20 hours, and 100 weeks if the student receives only 15 hours' instruction weekly.

The actual number of hours of *laboratory work alone* in a good school of pharmacy giving a program of instruction such as students not employed in concurrent wage earning must have cannot be crowded into less than three days weekly, and a student who is unable to be in attendance more than three days a week can, therefore, have no time left for lectures, recitations and other college exercises without which the laboratory courses would be useless.

The laboratory work is in any pharmaceutical school the most important instruction given and should constitute at least two-thirds of the entire program.

The only possible way in which any student carrying a half-time program of weekly college work can accomplish as much in the end as the student who does twice as much college work weekly is to continue his college attendance twice as many weeks.

A combination of drug store employment with the college courses has been found extremely unsatisfactory as a system of education of pharmacists, because the student cannot well serve two masters. The kind of work students can get in drug stores during their college attendance is rarely of any educational value, as it cannot possibly be made to supplement in the slightest degree their courses of study. Students so employed are rarely if ever allowed any time to devote to study while on duty in the store. Any system which depends upon the co-operation of third parties cannot be satisfactory and it is impossible for colleges to find positions in drug stores for any large number of students.

How Students Can Best Work Their Way Through College.

The faculty of this School offers prospective students who desire to work their way through college this advice: Whenever you attend the College of Pharmacy, give up your whole time to it. Do not combine your college course with concurrent drug store employment. Do one thing at a time, and do each well. Spread your college course over a longer period. Attend only one semester of 18 weeks annually. Then you can devote the remaining 34 weeks of each year to drug store employment and save enough out of your wages in that time to pay your way through the next session, and so on. In this manner you can finish the whole course for the degree of Graduate in Pharmacy within two years and 18 weeks after the date of your admission. Your college work will be far more effective and successful if not interfered with by other duties.

The Course for the Degree of Pharmaceutical Chemist.

This course embraces four college half-years, or two college years of nine months each, with 30 hours' instruction weekly.

When to Enter.

Students may commence their courses at the beginning of any semester—in September or in February.

Admission Requirements.

Matriculants in the course for the degree of Graduate in Pharmacy must furnish authoritative evidence of having satisfactorily completed one year's work in a standard high school, or an educational equivalent. Certificates issued by the proper school authorities showing the branches of study, hours per week devoted to each branch, and final standings are required. Blanks are furnished on application for this purpose.

Matriculants in the course for the degree of Pharmaceutical Chemist must furnish evidence of graduation from high school, or an equivalent education.

No student is admitted under eighteen years of age unless he has had two years or more of high school work, in which case he may enter at seventeen.

The Faculty.

The faculty of this School includes thirteen professors and assistants, of whom nine are pharmacists. These teachers, with but two exceptions, give all their time and attention to their work in this School, having no other occupations and no other classes, and the students of this School receive all their instruction from this special pharmaceutical faculty exclusively. All of the courses of study are therefore readily and perfectly adapted to the special requirements of pharmacy.

Courses of Study.

Descriptions of the courses in detail are furnished upon application. They include General and Inorganic Chemistry, Analytical Chemistry, Organic Chemistry, Pharmaceutical Botany, Microscopy and Pharmacognosy; Physiology; Materia Medica; Drug Assaying and Sanitary Analysis; Urine Analysis; Weights and Measures; General Principles of Pharmacy, Pharmaceutical Processes and Manipulations; Applied Inorganic Pharmaceutical Chemistry, Manufacturing, Dispensing, Pharmacopœias, Nomenclature, Pharmaceutical Jurisprudence, Commercial Pharmaceutical and Sick Room Supplies, and Business Training.

Expenses and Deposits.

Matriculation fee, $5.00.

The matriculation fee is payable only once and before registration. It is not returnable under any circumstances.

Tuition for all courses of instruction, one term or semester of 18 weeks, including drugs, chemicals and other materials consumed in the laboratory work, each term	$65.00
Fee for the use of instruments and apparatus and for their maintenance, each term	2.00
Deposit required to cover breakage or loss of apparatus and other school property	8.00

Aprons, sleeves, note-books, pencils, spatulas, dissecting needles, rubber tubing, and various other articles with which the students must supply themselves for individual use are furnished by the School for their convenience at cost prices; but to avoid bookkeeping each student is required to obtain a coupon ticket to the amount of $5.00. The prices of the articles are punched out of the coupon ticket, and any unused coupons are redeemed at the end of the school term. Supplies of this kind are issued in no other way, but the student may purchase them wherever he sees fit.

The diploma fee is $10.00.

Individual lockers in which students may keep their hats, coats, books and other articles, are furnished to all students free of charge.

No tuition or other fees are refunded except in case of the student's illness. In that case, if the student presents a certificate from a physician that he is unable to remain in attendance, and a statement from the Dean of the School that he is in good standing, one-half of the current semester's fees will be refunded, provided application is made before the middle of the semester.

Board and Room.

Good board and room together can be secured near the School at from $4.00 to $6.00 per week. Students may also secure rooms and board separately. Information in regard to these matters and addresses of reliable and satisfactory private boarding places and furnished rooms will be supplied at the College. Good accommodations are plentiful, and satisfactory arrangements can be quickly made by each student immediately upon his arrival.

For further information address the Dean of the School of Pharmacy, Northwestern University Building, 87 Lake Street, Chicago, Ill.

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NORTHWESTERN UNIVERSITY

BULLETIN
OF THE
SCHOOL *of* PHARMACY

UNIVERSITY OF ILLINOIS

PRESIDENT'S OFFICE.

1851

ALL DRUGGISTS SHOULD READ THE ARTICLE ON PAGES 5 TO 7 OF THIS ISSUE

NORTHWESTERN UNIVERSITY BUILDING
LAKE AND DEARBORN STREETS, CHICAGO

THE TWENTY-FIRST YEAR BEGINS SEPTEMBER 24, 1906

Entered June 24, 1902, at Chicago, Illinois, as Second-Class Matter, under Act of Congress of July 16, 1894.

NORTHWESTERN UNIVERSITY

EVANSTON—CHICAGO

The University comprises the following departments of instruction, each having a distinct Faculty.

The special announcements of the several departments of the University may be had on applications addressed as follows:

College of Liberal Arts, *The Registrar,* University Hall, Evanston, Ill.

Medical School, *The Secretary,* 2421 Dearborn Street, Chicago.

Law School, *The Secretary,* Northwestern University Building, Chicago.

School of Pharmacy, *The Dean,* Northwestern University Building, Chicago.

Dental School, *The Secretary,* Northwestern University Building, Chicago.

School of Music, *The Secretary,* Music Hall, Evanston, Ill.

For information concerning the non-degree conferring departments, address

The Academy, Evanston, Ill.,
Prof. Arthur H. Wilde, Ph.D., *Principal.*

Grand Prairie Seminary, Onarga, Ill.,
Henry Hoag Frost, A.B., *President.*

Elgin Academy, Elgin, Ill.,
Mr. George E. Sleight, A.B., *Principal.*

For information concerning the Theological Schools, address as follows:

Garrett Biblical Institute,
Rev. Charles J. Little, LL.D., *President.*

Norwegian-Danish Seminary,
Rev. Nels E. Simonson, D.D., *Principal.*

Swedish Theological School,
Rev. Albert Ericson, D.D., *President.*

For information concerning the School of Oratory, address

Prof. Robert L. Cumnock, L.H.D., *Director,*
Evanston, Ill.

UNIVERSITY OF ILLINOIS

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1905-1906.

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MRS. MARY E. DAVIES, PH.G., *Library Assistant.*

BULLETIN

OF THE

SCHOOL OF PHARMACY

OF

NORTHWESTERN UNIVERSITY

THE RIGHT WAY TO CHECK EXCESSIVE COMPETITION IN THE DRUG BUSINESS.

There is but one way to prevent the evil of an excessive number of drug stores, but the druggists themselves do not seem to have given the matter much attention and accordingly have altogether mistaken notions about it. The one way to make the drug business profitable commercially happens to be also the best way to make it professionally satisfactory and to afford the public the most effective protection possible. Higher educational requirements for full registration by the Board of Pharmacy will accomplish these purposes. Nothing else will. But some timid druggists who have not studied the question are afraid that higher educational requirements for the license to open or conduct a drug store will result in a scarcity of clerks and thus increase the expense of conducting the business by making the wages of clerks unduly high. This is clearly an erroneous conclusion.

The radical evil from which drug business suffers is the ridiculous ease with which any one can secure the right to start a new drug store. This evil is aggravated in states where only one class of pharmacists is recognized by law—registered pharmacists having the right to open and conduct drug stores on their own account whenever they can command what they think is the necessary amount of cash capital. In all such states the clerk differs from his employer solely in that he has not yet started a store of his own.

As the employer in those states as in others must have one or more clerks he opposes higher educational requirements for license, forgetting that low requirements must inevitably increase the number of employers as well as clerks.

Clearly, both employers and clerks should be registered and licensed, but the requirements for the licensing of principals must be higher than those for the licensing of clerks. That, however, is not enough, for in most of the states where the law does distinguish between pharmacists and assistant pharmacists the examinations for full license are passed so readily that the registered pharmacists outnumber the assistants eight to one, as will be seen from the following figures reported to the American Pharmaceutical Association in 1905:

		Persons on the rolls of the Boards.	
States.	**Drug Stores.**	**Pharmacists.**	**Ass't. Pharmacists.**
California	1,000	2,761	811
Colorado	500	800	52
Delaware	125	296	51
Illinois	2,750	4,875	903
Indiana	1,943	3,396	368
Iowa	1,820	3,830	15
Kansas	1,225	1,565	36
Louisiana	575	858	109
Maine	395	642	16
Maryland	570	1,032	214
Michigan	1,600	3,377	395
Minnesota	925	1,442	211
New Hampshire	245	742	116
New Jersey	975	1,895	79
Ohio	2,070	3,472	611
Oregon	335	633	66
South Dakota	345	610	24
Tennessee	610	1,184	128
Utah	115	2,811	45
Washington	460	625	50
Virginia	535	849	87
Wisconsin	955	1,539	412
	19,983	39,234	4,799

In nearly all of these states the pharmacy laws have been in force long enough to correct the abnormal results of the registrations without examination which took place at the time they went into effect.

Now let us examine these figures. Illinois has less than 2,800 drug stores; but it has over 4,800 men authorized to conduct the drug business on their own account and only 900 registered assistants. It is a wonder there are not 3,500 drug stores in Illinois; but it is not at all wonderful that drug clerks are scarce.

It would be useless to try to correct these anomalous and disastrous conditions by "making the examinations more difficult." Any thoughtful man should be able to see that the only true remedy is *more through training* instead of more difficult examinations. If every candidate applying for license to go into business on his own account were required to satisfactorily complete a full two years' course in a good school of pharmacy as one of the prerequisites to such license we should have more clerks and fewer drug stores. But it would, of course, be necessary at the same time to rule that assistant pharmacists may properly and legally perform any and all of the duties of registered pharmacists during the temporary absence of the latter, and that temporary absence means all that it says and not merely "during meal hours."

There is no valid reason why a competent assistant pharmacist should not be left in a drug store to perform his legitimate duties without the personal presence of his employer for a whole month instead of a few hours. The very sufficient reason why the qualifications of the employer should be higher than those demanded of his clerk is that he is the responsible head and director of the whole establishment. There is no sense in any other view of the matter. Compulsory graduation in pharmacy as a prerequisite to the license to conduct a drug store must of necessity put a check on the already excessive multiplication of drug stores and every sensible druggist ought to see that.

By all means let us have more registered assistant pharmacists and a less number of registered pharmacists. Let the requirements for the licensing of registered assistants or clerks stand as they are, but increase the educational requirements for full registration by making graduation in pharmacy compulsory as it should be. That would make the license of every person already registered far more valuable, it would make the profession of pharmacy far more respected, it would give increased protection to the public, and place this country on a par with nearly all other civilized countries in the world. And yet it is easily done. It could not possibly cause any injustice or inconvenience.

THE DEMAND FOR GRADUATES.

Never before has there been such a great and emphatic demand for graduates in pharmacy, and never before has the compensation offered for their services been as high as it is now. There is a plentiful supply of apprentices in Illinois, and there is almost everywhere a floating contingent of unemployed drug clerks; but desirable and well trained drug clerks are hard to find. This condition of things has continued for several years, at least in the West.

CONSISTENCY, THOU ART A JEWEL.

The new Iowa pharmacy law provides that graduates of schools of pharmacy "whose entrance and graduation requirements are equivalent to those prescribed by the American Conference of Pharmaceutical Faculties for the year 1905, and whose course of study consists of two years of not less than 36 weeks each," shall be eligible to take the examination for registration as pharmacists without being required to prove any drug store experience. The American Conference of Pharmaceutical Faculties requires a minimum of 1,100 hours' instruction, and does not require any drug store experience. Hence the graduates of any schools which may spread 1,100 hours' instruction over a total attendance of 72 weeks (giving about 15 hours' instruction weekly) may be licensed to conduct drug stores in Iowa without having had a day's practical experience in pharmacies!

In Alabama, Arkansas, Delaware, District of Columbia, Florida, Missouri, Oklahoma, and West Virginia, the graduates of all schools demanding drug store experience as a prerequisite to graduation are licensed without examination, no questions being asked as to whether those schools are good, bad or indifferent.

In West Virginia four years' drug store experience is required of graduates, but three years of non-graduates.

In New Mexico the law authorizes the Board of Pharmacy to license without examination the graduates of schools requiring drug store experience for graduation; but the Board, being given discretionary powers by the law, discretely declines to license any graduate on such grounds.

In Kansas the law authorizes the Board to license without examination the graduates of any school of pharmacy approved by the Board, but the Board has up to this time withheld its approval of any school that does not require drug store experience for graduation, although the law is silent on that point.

Georgia licenses all graduates without requiring any "experience."

Mississippi licenses anyone who can pass the Board examination, without requiring any practical experience.

Over forty states which require practical experience as a prerequisite to license give no credit whatever for any education in any school of pharmacy.

When will it be universally recognized that practical experience in pharmacies is an absolutely necessary requirement for license (but not for graduation), that the boards of pharmacy (not the colleges) must require proof of that practical experience, that the age and general education precedent to that practical experience must be such as to render it at least possible that it may be of real value, and that the experience must not consist altogether of work utterly foreign to pharmacy?

A NEW DEAL IN KANSAS.

The Kansas State Board of Pharmacy has prepared and sent to the schools of pharmacy a printed blank upon which they may make application for recognition by said Board. Reports are required showing the equipment, organization, requirements for admission and graduation, courses of instruction, and other essential facts concerning the schools applying for recognition. Such reports were first required by New York and Ohio. Let all state boards follow this excellent example.

GRADUAL ADVANCE IN EDUCATIONAL REQUIREMENTS IN PHARMACY.

Step by step some progress is made. The news has reached us from New York that the extent of the courses of education in pharmacy prescribed by that state for registration is to be materially increased. It is also confidently expected that the only two schools which have membership in the American Conference of Pharmaceutical Faculties but which have not yet increased their entrance requirements to include one year's high school work, will do so next year when the Conference has had time to revise its standards.

THE SCHOOL OF PHARMACY OF NORTHWESTERN UNIVERSITY

THE UNIVERSITY was chartered by the State of Illinois in 1851. In 1904-'05 its degree conferring departments had 2,682 students and its other schools 1,161, making a total of 3,843.

THE SCHOOL OF PHARMACY was established in 1886. It had 252 individual students in 1904-'05. The average annual attendance for twenty years has been 215. The average for the past five years, including 1905-'06, has been 229. From 20 to 25 states are annually represented in the classes.

It is located in NORTHWESTERN UNIVERSITY BUILDING, in the heart of Chicago, corner Lake and Dearborn Streets, easily accessible from any part of the city. The School of Pharmacy occupies the entire fourth floor, 160x180 feet.

The EQUIPMENT of the School is worth over $25,000 (March, 1906).

The LABORATORIES are six. They are for the exclusive use of the pharmacy students, have a total floor space of 9,570 square feet, and are provided with 292 individual work tables, enabling that number of students to be all at work at one time. The *qualitative chemical laboratory* has a floor space of 1,800 square feet; the *quantitative chemical laboratory* 1,450 square feet; the *organic chemical laboratory* 1,900 square feet; the *laboratory for botany and pharmacognosy* 1,224 square feet; the *pharmaceutical manufacturing laboratory* 2,300 square feet; and the *dispensing laboratory* 900 square feet. Several laboratories of other departments of the University are, in addition, open to the students of pharmacy.

The LECTURE ROOMS are two, one seating 184, the other 86.

The STUDENTS' ROOMS are two—one for men and one for women.

The MUSEUM contains over 2,000 specimens, including all kinds of manufactured pharmaceuticals, sick room supplies, and other articles usually furnished by up to date first class pharmacies.

The LIBRARY occupies about 1,000 feet of floor space, and contains the most valuable reference works worth about $3,500.

The FACULTY includes thirteen teachers and assistants, of whom nine have had practical experience in pharmacy. These teachers, with but two exceptions, give all their time and attention to their work in this School, having no other occupation and no other classes.

A FULL PROGRAM OF INSTRUCTION is given, carefully prepared with the view to occupy the student's whole time to his best advantage. It is not a "three-days-a-week" school.

The LABORATORY WORK alone, which is the most important feature of modern pharmaceutical education, amounts to 20 hours weekly.

PRACTICAL CHARACTER OF THE COURSES.—

All of the work included in the courses of instruction for the degrees conferred in this School is most carefully adapted to the special requirements of pharmacists. This practical adaptation of the courses to the occupation of pharmacy is rendered more effective by the fact that so great a number of the members of the faculty have themselves had extended and varied experience in that profession.

The important basis of the courses is the Pharmacopœia, which every well trained pharmacist must be able to thoroughly understand in all its parts. The classes are drilled with especial care in all that pertains to the crowning function of all pharmacy—the best possible technical service at the dispensing table. Students are also given practical instruction designed to make them familiar with all kinds of unofficial drugs, preparations and supplies which physicians and the public now expect all first class drug stores to be prepared to furnish. It is the ambition of the Faculty of this School to make it in every way the most efficient practical training school for pharmacists.

COURSE FOR THE DEGREE OF PH.G.—This occupies three semesters or half-years of about 18 weeks each, or a total of about 52 weeks' work, embracing over 500 hours of lectures and recitations and over 1,000 hours of laboratory work.

COURSE FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.—This is a full two years' course with nine months' work in each year, or four semesters. The instruction amounts to over 600 hours of lectures and recitations and 1,600 hours' laboratory work.

NEXT YEAR'S WORK BEGINS on Monday, September 24, 1906.

ADMISSION REQUIREMENTS.—One year's satisfactorily completed high school work or its full educational equivalent is required for admission to the course for the degree of Graduate in Pharmacy. This is now required by law or by the rules of the Boards of Pharmacy in several states. Students are not admitted under 17 years of age.

The educational entrance requirement for the degree of Pharmaceutical Chemist is high school graduation.

POSITIONS FOR GRADUATES.—The demand for graduates of this School to occupy good positions it at all times greater than the supply. For some years past every graduate has been engaged before graduation day.

The occupations open to the alumni include: the drug business, wholesale and retail; professional pharmacy; positions as pharmacists in the Army and Navy and the Public

Health and Marine-Hospital Service; hospital pharmacists; work as commercial and sanitary public analysts and in the establishments of manufacturing pharmacists and chemists. Over twenty of the alumni have become teachers in pharmaceutical and medical schools.

Northwestern University School of Pharmacy is a member of the AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES, and is recognized in all States where any standards of efficiency have been established by law or by the Boards of Pharmacy.

TUITION AND OTHER EXPENSES.—Matriculation fee $5. Tuition and materials $65 for each semester of 18 weeks. Total laboratory fees and deposits $10. Diploma fee $10.

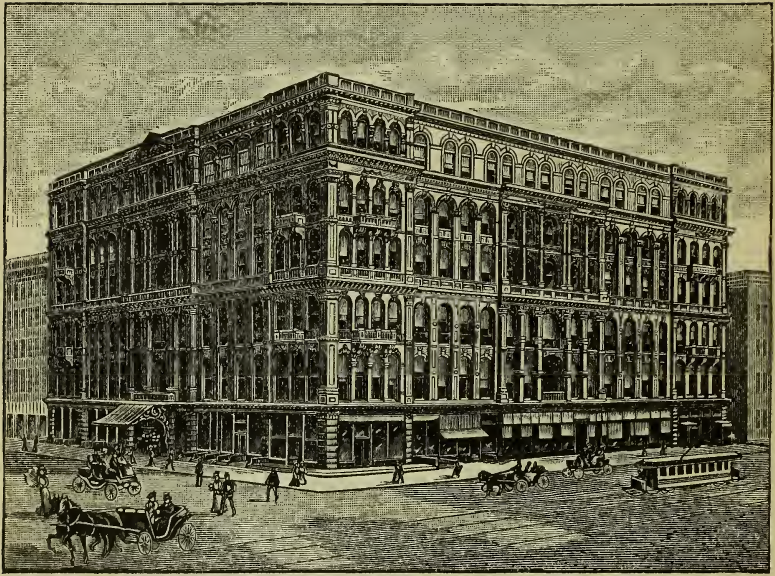
HOW STUDENTS MAY WORK THEIR WAY THROUGH THIS COLLEGE.—The faculty of this School offers prospective students who desire to work their way through college this advice: Whenever you attend the College of Pharmacy, give up your whole time to it. Do not combine your college course with concurrent drug store employment. Do one thing at a time, and do each well. Spread your college course over a longer period. Attend only one semester of 18 weeks annually. Then you can devote the remaining 34 weeks of each year to drug store employment and save enough out of your wages in that time to pay your way through the next session, and so on. In this manner you can finish the whole course for the degree of Graduate in Pharmacy within two years and 18 weeks after the date of your admission. Your college work will be far more effective and successful if not interfered with by other duties.

BOARD AND ROOM.—Good board and room together can be secured near the School at from $4 to $6 per week. Students may also secure rooms and board separately. Information in regard to these matters and addresses of reliable and satisfactory private boarding places and furnished rooms will be supplied at the College. Good accommodations are plentiful, and satisfactory arrangements can be quickly made by each student immediately upon his arrival.

Students who are strangers to the city are, if desired, met upon their arrival and given every courtesy by the Northwestern University School of Pharmacy Secretary of the Y. M. C. A. and his aids, who have permanent offices in Northwestern University Building.

Send for COMPLETE CATALOGUE of the School-Bulletin for March to May, 1906—containing descriptions of the courses of study, rosters of students and graduates, register of the alumni, and a synopsis of the state pharmacy laws of the United States.

For further information address the Dean of
The School of Pharmacy, Northwestern University Building,
87 Lake Street, Chicago.



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Northwestern U. Pharmacy 1905-6

VOLUME V SEPTEMBER TO NOVEMBER, 1906 NUMBER 2

NORTHWESTERN UNIVERSITY

THE LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

BULLETIN
OF THE
SCHOOL *of* PHARMACY

UNIVERSITY OF ILLINOIS

PRESIDENT'S OFFICE.

1851

NORTHWESTERN UNIVERSITY BUILDING
LAKE AND DEARBORN STREETS, CHICAGO

NEXT SCHOOL SESSION BEGINS FEBRUARY 15, 1907

Entered June 24, 1902, at Chicago, Illinois, as Second-Class Matter, under Act of Congress of July 16, 1894.

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Northwestern University School of Pharmacy.

COURSES OF STUDY.

Courses of Study included in the curricula for the degrees in pharmacy. All these courses are obligatory unless otherwise stated.

The Departments are: A, Pharmacy; B, Chemistry; C, Botany and Pharmocognosy; D, Human Anatomy and Physiology; E, Materia Medica and Therapeutics; F, Business Training; G, Bacteriology.

COURSES FOR THE DEGREE OF GRADUATE IN PHARMACY.

Course A1.—*Weights, Measures and Pharmaceutical Arithmetic.*—Principles of metrology. The metric system. The customary weights and measures of America and Great Britain. Weighing and measuring. Balances and weights. Specific density and specific volume. Instruments employed in determining mass and volume and their relations. Working formulas expressed in fixed quantities and in "parts by weight."

Actual practice in pharmaceutical problems connected with the metric system; the relations of weight and volume; percentage strength; problems in diluting and strengthening alcohol, solutions and preparations, and other calculations commonly occurring in pharmaceutical work and in manufacturing.

The importance of this course is best understood from the fact that no feature of the State Board examinations in pharmacy is more prominent than the questions in this direction.

Two hours weekly through one semester.

Course A2.—*Organic Materia Pharmaceutica.*—Preparatory study of the materials used in the manufacture of pharmaceutical preparations.

This course is designed to impart to the student a sufficient degree of practical familiarity with the general character and properties of important classes of raw materials, out of which he must later make finished preparations.

The general properties and behavior of the most important classes of constituents of plants, such as cellulose, starch, pectin, mucilage, sugars, albumin, fixed oils, volatile oils, resins, tannin, amara, glucosides and alkaloids are reviewed sufficiently to render the practical study of their extraction or elimination, and the manufacture of preparations of plant substances, intelligent and effective.

About eighteen lectures and recitations. Laboratory work supplementing these is included in course A4.

COURSE A3—*Pharmaceutical and Chemical Manipulations.*—A preparatory course of lectures and recitations on laboratory operations employed in making and purifying pharmaceutical, chemical and other related products. The course covers such processes as those of powdering, solution, filtration, evaporation, crystallization, distillation, precipitation, methods of extraction, including percolation, etc.

Laboratory practice is given in Course A4.

Eighteen lectures and recitations.

COURSE A4.—*Preparatory Laboratory Course in the Study of the Materials and Operations of the Production of Pharmaceutical and Chemical Preparations.*—Experimental work on the physical properties and behavior of the raw materials and constituents referred to in course A2. The separation of the constituents from the crude plant substances and from each other, and the manufacture of certain products in the preparation of which the general character of the materials may be most effectively studied.

The manipulations discussed in course A3 are exemplified by actual practice and the work selected is such as will best familiarize the student with the apparatus employed, the most common materials operated upon, the methods and manipulations, and the simpler preparations. Thus a part of the work consists of examples of the purification of commercial chemicals by recrystallization and by other means. The inorganic substances operated upon include the most common metals, the common acids and alkalies, oxides, salts and other compounds, with which the student thus acquires a sufficiently extensive and living practical familiarity to greatly facilitate his grasp of the science of chemistry.

This course consists of two laboratory periods weekly of three hours each, continuing through one semester.

COURSE A5.—*Applied Inorganic Pharmaceutical Chemistry.*—The principles specially governing the processes by which inorganic chemical products are made. The selection of materials and methods. Since the chemical products which are pharmaceutically important embrace not only the chemicals which are used in medicine alone, but almost all the products which are industrially important, this course covers practically all kinds of inorganic chemical preparations.

Lectures and recitations two hours weekly through one semester.

Supplemented by courses A4 and A6.

COURSE A6.—*Laboratory Practice in the Manufacture of Inorganic Chemical Preparations.*—A great variety of inorganic chemicals are manufactured by the students, including typical examples of nearly all classes of compounds. Particular attention is given to pharmaceutical chemicals of special importance or interest or affording especially instructive practice. Among the raw materials employed in the Manufacturing Laboratory are many minerals and other crude natural products in order that students may have practical experience in making finished chemical preparations out of the cheapest and most common materials that can be successfully used. Other and purer materials are, of course, also employed whenever requisite. Hundreds of specimens of the products manufactured by the students are exhibited at the School and are open to inspection by any one interested.

Two laboratory periods weekly of three hours each through one semester.

COURSE A7.—*General Review of all Classes of Galenical Pharmaceutical Preparations, Including Dispensing.*—Stock preparations as well as extemporaneous preparations. All kinds of extracts, liquid and solid, such as tinctures, wines, fluid extracts, solid extracts, vinegars, oleoresins, precipitated resins.

Powders, triturations, masses, troches, tablets, pills, capsules. Cataplasms, ointments, cerates, plasters, suppositories, bougies. Waters, mucilages, syrups, emulsions, mixtures. Infusions and decoctions.

Two hours weekly through one semester.

This course is supplemented by laboratory work in Courses A4, A6, A8, and A12. It is also supplemented by Course A11.

COURSE A8.—*Laboratory Course in Dispensing.*—It is now generally conceded that a systematic course of laboratory training in the art of making extemporaneous pharmaceutical preparations and in compounding and dispensing medicines must be a fundamental and crowning feature of any first-class school of Pharmacy. In the Dispensing Laboratory of the School of Pharmacy of Northwestern University (the first workshop of its kind) the student sees and learns to use an outfit of dispensing apparatus many times as extensive as can be found in many of the best drug stores together. Every student is required to make a great variety of extemporaneous preparations. The lessons are systematically prepared or selected with the view to include all important phases of work at the dispensing table with all kinds of materials and by all the different methods practiced. A practical experimental study of incompatibilities is included in this course.

Three laboratory periods of two hours each, weekly, through one semester.

COURSE A9.—*The Practical Pharmacy of Important Individual Organic Drugs.*—The character, constituents, preparations, etc., of all important pharmacopœial and some important unofficial drugs. Relation of the chemical constituents to the preparations made of it and the methods employed.

Two hours weekly through one semester.

COURSE A10.—*The Pharmacopoeia of the United States.*—Lectures and recitations on the character, scope and functions of pharmacopœias. A systematic study of the essential distinctive features of the text of the American Pharmacopœia.

How it is constructed.

The principles of construction of systematic pharmaceutical nomenclature and its relations to proper classification of the medicinal substances. The bearings of the nomenclature upon scientific pharmacy. Latinic and non-latinic titles. Non-systematic names. The latinity of the American pharmacopœial nomenclature.

Every American student of pharmacy should own and study the Pharmacopœia of the United States, and in the School of Pharmacy of Northwestern University that law-book for the pharmacist is studied in the class room, book in hand. Each student is expected to have the text before him at every recitation.

Two hours weekly through one-half semester.

Course A11.—*The Professional-Technical Duties and Responsibilities of Pharmacists,* including the relations of pharmacists to the medical profession and the community.

The Prescription; its construction and interpretation. The prescription table and its problems. Dispensing.

The demands of modern scientific medicine upon the pharmacist of this century.

Pharmacy laws, poison laws, etc.

Two hours weekly through one-half semester.

Course A12.—*Further Laboratory Practice in the Production of Miscellaneous Pharmaceutical Products.*—More advanced work in the Manufacturing Laboratory.

Three laboratory periods weekly of three hours each through one semester.

Course A13.—*Miscellaneous Supplies of Modern Pharmacies,* such as unofficial medicinal preparations and products; surgical instruments, bandages, dressings, plasters, etc.; sanitary and dietitic and other sick room supplies, including antiseptics and disinfectants; and other similar articles which the medical profession and the public expect all first-class pharmacies to furnish.

These lines of goods, including specialties, are described and shown to the classes, ample exhibits being provided at the School for that purpose.

Samples of the finished products of manufacturers of pharmaceutical products, such as coated pills, capsules, troches, fluid and solid extracts, elixirs, and other classes of preparations are also exhibited and discussed.

The object of this course is to familiarize the student as far as possible with the supplies of this kind which he must handle as a pharmacist and about which he must be well enough informed to perform that duty intelligently.

Two hours weekly through one-half semester.

Course A14.—*Business Training.*—A course of class exercises and practice designed to teach the student how the most common and essential commercial affairs connected with the drug business are conducted, including bookkeeping. Students are taught the nature and uses of invoices, bills, statements, orders, receipts, the banking business of the druggist, bills receivable and payable, drafts, notes, checks; they learn something of the meaning and uses of price lists and discounts, credits, collections, remittances, consignments, taking stock, partnership, commission, insurance, interest, taxes; contracts, leases, bills of sale, etc.

Two hours weekly through one-half semester.

Course A15.—*Pharmaceutical and Chemical Problems and Exercises.*—Practice in writing equations representing chemical reactions, occurring in pharmaceutical work, and in making stœchiometric and other computations.

Two hours weekly through one semester.

Course B1.—*General Inorganic Chemistry.*—An introductory course in which the student lays the foundation necessary for successful work in the other courses in chemistry and in the courses in pharmacy. The elementary principles of the science are developed in connection with the consideration of oxygen, hydrogen, nitrogen, and the other specially important non-metallic elements and their compounds.

Lectures and recitations five hours weekly through one semester.

Course B2.—*General Inorganic Chemistry, Laboratory Work.*—This course, together with the lectures and recitations described in courses B1 and B3, form an integral course, the discussion of the theories of the science in the lecture room being supplemented as far as practicable by the experiments performed in the laboratory. There the student prepares the more important elements and their compounds and observes the physical and chemical properties of each. Emphasis is laid on the logical and discriminating interpretation of the results of the experiments.

Three laboratory periods weekly, of three hours each, through part of one semester, the remainder of that semester being occupied by course B3.

Course B3.—*Qualitative Analysis (Known Substances).*—Study in the laboratory and class room of the methods of separation and identification of the principal bases and acids, together with the reactions involved.

In this course the practical requirements of the pharmacist and chemist in the intelligent application of the identity and purity tests of the Pharmacopœia are kept in view.

Courses B2 and B3 together occupy three laboratory periods, or nine hours, weekly through one semester.

Course B4.—*Qualitative Analysis (Unknown Substances.)*—The analysis of mixed substances, the composition of which is unknown to the student, and the detection of impurities in pharmaceutial and commercial chemicals.

One lecture or recitation and three laboratory periods of three hours each, weekly, through one-half semester.

Course B5.—*Quantitative Analysis, Chiefly Volumetric.*—An introduction to the methods and underlying principles of quantitative analytical work through the study of typical methods. Due attention is paid to the use of the standard "volumetric test-solutions" of the Pharmacopœia.

One lecture or recitation and three laboratory periods of three hours each, weekly, through one-half semester.

Course B6.—*General and Pharmaceutical Organic Chemistry.*—A course of lectures and recitations on the general principles of organic chemistry, with the study of the most important carbon compounds and their classifications. Particular attention is given to substances employed in medicine and pharmacy, such as the important alcohols, ethers, aldehydes, acids, esthers, ketones, certain compounds of the aromatic series, the so-called "synthetics" of the newer materia medica, etc.

Lectures and recitations five hours weekly, extending through one semester.

Course B7.—*Laboratory Course in Pharmaceutical Organic Analysis.*—Training in the performance of certain pharmacopæial processes of assay, including the valuation of preparation of opium, cinchona and nux vomica and of citrate of iron and quinine, etc. The valuation of pepsin, pancreatin, and malt extract, the estimation of alcohol in liquids, etc.

Two laboratory periods of three hours each, weekly, extending through one semester.

Course C1.—*General Botany,* including Organography and Taxonomy.—A course of lectures and recitations designed to give the student a good general conception of the great plant groups, to present the facts most essential to an intelligent study of vegetable drugs, to elaborate and recapitulate the lessons of the work in the microscopical laboratory, and to impart a knowledge of the classification of plants and the rules of nomenclature.

One hour weekly through one semester.

Course C2.—*The Microscope and How to Use It.*—A study of the optical properties of mirrors and lenses especially applied to the mechanism and manipulation of the compound microscope. Actual practice in manipulation is given, including methods of determining magnification.

The very best imported instruments with 1-inch and ¼-inch objectives, two eye-pieces, double nose-pieces, coarse and fine adjustment, and all other important accessories, are furnished to all students.

This course is a necessary preparation for course C3, C4 and C5.

Course C3.—*The Microscopic Structure of Plants.*—A laboratory course especially designed to prepare the student for the examination of drugs and other vegetable raw materials, with reference to the determinatiion of their identity and quality, and for the detection of adulterations in powdered substances. Particular emphasis is placed upon the anatomy of roots, stems and leaves. A special study is made of starch granules, aleurone and crystals. Each student is assigned a microscope for his own individual use and is furnished with an especially prepared laboratory guide. Cutting sections, preparation of mounts and use of micro-reagents are daily practiced.

Five hours laboratory work weekly.

Course C4.—*Pharmacognosy.—A study of medicinally and* industrially important plant substances. About two hundred of the most important drugs, spices and other raw materials of vegetable origin are thoroughly studied. A study is made of the outer and, in many cases, the inner structures. Notes are made of the characteristic features, and spurious articles and adulterants also examined. Special effort is made to develop a capacity to intelligently interpret and apply the pharmacopœial descriptions for the identification of drugs and to form a correct judgment of their quality. Demonstrations are made from specimens of drugs and other substances likely to be confused with each other, but which may be distinguished by their respective structural differences.

The laboratory is abundantly supplied with materials, both dry and alcoholic, permanent mounts and choice museum specimens.

Six hours' laboratory work weekly through one semester.

D. Human Anatomy and Physiology.

A course of sixteen lectures and recitations intended to sufficiently acquaint the student with the morphology and physiology of the human body to enable him to understand the processes of digestion, assimilation, circulation, respiration and nerve action, and the physiological action of drugs.

E. Materia Medica and Therapeutics.

About thirty-two lectures and recitations on the properties, action, uses and doses of drugs and their preparations, together with a discussion of poisons and their toxic effects and antidotes.

COURSES FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.

All the courses for the degree of Graduate in Pharmacy, and, in addition:

Course A16.—*The Pharmacopœias of the World.—Comparative* study of the pharmacopœias of the world, their scope, style of construction, materia medica, chemistry, pharmacy, nomenclature, preparations, and other important features.

Course A17.—*Laboratory practice in the preparation of organic*, pharmaceutical and chemical preparations.

The production of natural plant substances such as alkaloids and glucosides, and of the more common organic chemical preparations. Among the products made are, for instance, salicin, piperin, aloin, amygdalin, berberine, ether, chloroform, iodoform, actic ether, nitrous ether, methyl salicylate, etc.

Six hours weekly through one semester.

Course B8.—*Quantitative Analysis, Chiefly Gravimetric.*—This laboratory course begins with the simple fundamental operations characteristic of the general method and proceeds to the special processes involved in the actual gravimetric determination of inorganic substances. Practice is given in the determination of the more important bases and acids and in the separation of a sufficient number of substances to make the student familiar with the essential features of this branch of quantitative chemistry.

Nine hours weekly, through one-half semester.

Course B9.—*Urine Analysis*, qualitative and quantitative. The detection and determination of constitutents of urine which are of importance in the diagnosis of disease.

One lecture or recitation and nine hours' laboratory work, weekly, through one-half semester.

Course B10.—*Special Course on Alkaloids, Glucosides, etc.*—A course of about eighteen lectures upon the alkaloids, glucosides and other definite chemical compounds contained in drugs and other plant substances. Their composition, separation, identification, properties and relationships. Two hours weekly through the second semester.

Course B11.—*Advanced Pharmaceutical Testing.*—Practice in the separation, identification and estimation of alkaloids. Further work in the official methods of assaying drugs and preparations. The examination of organic substances for the detection of impurities and adulterations. Practical study of methods of taking melting points and boiling points. Quantitative estimations of certain solutions and preparations, such as formaldehyde, etc. Nine hours' laboratory work weekly through one semester.

Course B12.—*Food and Sanitary Analysis.*—The examination of water to determine its potableness and fitness for household uses and the examination of milk, butter, cheese, beverages, and food products generally, and such other work as is usually required of public analysts for sanitary purposes.

One lecture or recitation and nine hours' laboratory work weekly through one semester.

Course C5.—*Commercial Microscopy.*—A course designed to afford the requisite training for the duties of the Pharmaceutical Chemist and Public Microscopist, including the examination of powdered drugs, spices, food-stuffs, etc. Specially prepared cross and longitudinal sections of whole specimens are supplied for comparison with the tissue elements as found in powders. A thorough study of the various kinds of starch is made. Hairs and textile fibers are studied. Training is given in microtechnique, including micrometry and work with the camera lucida and polariscope. Special methods for the isolation and determination of the structural elements of woods, stems, leaves, barks, roots, rhizomes, seeds, fruits, glands and spores.

Course F.—*Bacteriology.*—Lectures and laboratory work 6 hours weekly through about 15 weeks. The most approved methods are taught.

Bacteria in health and disease. Culture media. Culture methods. Staining. Identification of some of the more common bacteria of earth, air and water. Toxins and antitoxins.

The course is a practical one, enabling the student to fit himself to do successfully the bacteriological work ordinarily required for medical diagnosis and for sanitary purposes.

RECOMMENDATIONS TO THE BOARDS OF PHARMACY.

Adopted by the American Pharmaceutical Association and by the
Joint Conference of Boards and Schools of Pharmacy
at Indianapolis, September, 1906.

1st. All laws and regulations governing the licensing of pharmacists should make due distinction between apprentices, clerks and principals, and should establish definite minimum qualifications and indicate the rights and duties of each of these three classes of pharmaceutical workers.

2nd. No person should be licensed to practice as an assistant pharmacist who has not attained the age of twenty-one years.

3rd. The pharmaceutical training and experience required for the licensing of assistant pharmacists should together occupy not less than four years, all of which may consist of drug store practice, or which may consist of three years' drug store practice and one academic year's work in a pharmaceutical school, or of two years' drug store practice and two academic years' work in a school of pharmacy.

4th. No person should be licensed as a registered pharmacist and given the right to conduct a pharmacy who has not served at least two years as an assistant pharmacist, provided, however, that when any licensed assistant pharmacist attends upon the courses of instruction at a school of pharmacy subsequent to the date of his license as such, the time occupied by such school attendance may be deducted from that two years' service.

5th. The pharmaceutical college training and drug store experience required for the licensing of registered pharmacists should together occupy not less than five years, of which not less than three years should be drug store experience, and graduation from an approved school of pharmacy should be required of all candidates for license as registered pharmacists.

6th. All candidates for license to practice pharmacy should be required to pass such examinations as may in the opinion of the Board of Pharmacy be deemed necessary. Due credit should be given for successfully completed courses in approved pharmaceutical schools, but all candidates should be examined upon their ability to correctly read and dispense prescriptions.

7th. A preliminary general education of not less than one year's satisfactorily completed high school work, or its educational equivalent should be required as a prerequisite to the pharmaceutical experience or apprenticeship required for the licensing of registered pharmacists and assistant pharmacists and for admision to pharmaceutical schools.

8th. In the determination of the fitness of any applicant to receive a license to practice pharmacy, all important facts of his educational history, practical experience and technical services should be taken into account, including his preliminary general education, his special education in pharmaceutical and other related technical schools, his practical experience in pharmacy and the results of the examinations he has passed and an average of these several factors, each assigned its appropriate value, should be adopted as the passing grade.

9th. Definite and uniform conditions of efficiency should be adopted which all pharmaceutical schools must comply with in order to receive recognition by the Boards of Pharmacy in all cases where students and graduates receive credit in any form for the courses they have completed, or for the time of attendance at such schools, these conditions of efficiency to be made public and to be applied equally to all schools.

The conditions of efficiency prescribed for the recognition of schools of pharmacy should relate solely to matters affecting the character of their educational work.

10th. Special education for the practice of pharmacy is in this age a necessity and should as rapidly as possible be made compulsory and the rules of the Boards of Pharmacy should be such as to promote and encourage it in all practicable ways. The special pharmaceutical education required should include substantial laboratory courses.

11th. A syllabus of pharmacy examinations should be prepared, which shall indicate the subjects to be included in the Board examinations as well as in the courses of instruction in the pharmaceutical schools, with the view to the attainment of a reasonably uniform standard of minimum requirements which may be adopted by all boards and schools.

12th. A national committee on examination questions should be appointed by the National Association of Boards of Pharmacy, which committee should include experienced specialists in the subjects mentioned in the syllabus of pharmacy examinations, who shall, under the direction of the said association, prepare questions suitable for the examinations to be held by such state boards of pharmacy as may avail themselves of the services of said committee.

13th. We recommend to all concerned that the foregoing principles and standards be adhered to in any amendments to the pharmacy laws hereafter proposed in order that national uniformity may be ultimately attained. The minimum requirements indicated, and especially the preliminary general education, should be increased from time to time as circumstances permit. We further strongly urge that the boards of pharmacy employ the discretionary powers already theirs under existing laws to improve the educational status of the pharmacists of the future.

Action of the Boards upon the Recommendations submitted by the A. Ph. A. and the Joint Conference.

Recommendations 1, 6, 8, 9, 10, 11 and 13 were adopted.

Recommendation number 2 proposing that no person be licensed as a Registered Assistant Pharmacist who has not attained the age of 21 years was amended to read 18 years instead of 21. Those who voted for this amendment probably overlooked the important fact that unless registered assistant pharmacists are of the legal age of maturity they can not be permitted to dispense medicines except in the presence and under the supervision of registered pharmacists and the further fact that if apprentices are registered as proposed in recommendation 1 the apprentices will take the place now occupied by assistant pharmacists under present laws and rulings.

All the recommendations as originally drawn form a consistent system and they are interdependent. Some of them are so important that they can not be rejected without radically changing or destroying the whole plan. The plan contemplated by the recommendations is to provide apprentices fit to learn pharmacy, fit to finally become pharmacists, and fit at once to *assist* in all duties in the drug store *under supervision*, but not permitted to compound prescriptions or sell or dispense poisons.

It is proposed further that when the apprentices are allowed to *assist* in practically all the daily routine work of the store but not to perform any important duty without immediate supervision, the assistant pharmacists shall be permitted under *general* supervision and direction to compound prescriptions, dispense all kinds of medicines including poisons, and perform every duty in the line of pharmacy except to open, conduct or manage a pharmacy. They can then do their work in the store in the "temporary absence" of the registered pharmacist in charge even if that temporary absence extends over several days or several weeks, provided the direction and supervision of the whole establishment and of the assistant at work in it be, in fact, in the hands of a registered pharmacist. The assistant pharmacist must of course be a competent practical dispenser, but it is not at all necessary that he should be a man of such long experience and complete technical learning that he is also fit to be the managing principal of a pharmacy. Under such a system there would be a greater supply of clerks (including apprentices), the assistants would remain such a longer time, and the higher educational requirements proposed for registered pharmacists (principals) would check the rapid increase of drug stores which at present not only ruins the drug business but increases the demand for clerks while diminishing the supply. At the same time the plan proposed insures better protection to the public. *This plan, however, would be quite impossible unless the assistant pharmacist is required to be of the age of legal responsibility.*

Recommendation 3 was tabled by the meeting of the Boards. This action does not mean that the object sought is not approved but that the details did not strike the majority favorably. I am informed that some members thought four years too long a period of apprenticeship. I am further informed that strong objection was raised against accepting one academic year's work in a school of pharmacy as the equivalent of one calendar year given to drug store training. Recommendation 4 was tabled. But it is impossible to believe that the Boards deny that if any candidate for license has attended a school of pharmacy and done his work there successfully he should certainly receive full credit for it.

Recommendation 5 met the same fate as 3 and 4, probably for similar reasons. That the meeting was not opposed to requiring graduation from a pharmaceutical school as a prerequisite to full license is conclusively proven by the fact that recommendations 9 and 10 were adopted. Compulsory graduation in pharmacy as a requirement for full registration will be the salvation of American pharmacy, because it will not only make the occupation of the pharmacist more respected and afford the public greater protection but it will at the same time serve as a most effective check on the continued reckless increase of drug stores of the lowest grade.

The recommendation that the minimum preliminary general education of apprentices and students be not less than one year of high school work was amended by substituting grammar school graduation instead. This is better than nothing in view of the fact that in some states absolutely no education is now required. But it is deplorable that the Association of State Boards of Pharmacy did not see fit to at least recommend to the Boards that in every state where the conditions render it possible the preliminary education required for entering upon the occupation of pharmacy should be at once fixed at not less than one year's high school work. The Michigan law already requires practically two years of high school work, the New York law one year, and the rules of the Boards of Pharmacy of Wisconsin and South Dakota prescribe the same. That is also the minimum requirement for admission to all schools of pharmacy recognized as in good standing by the state of New York (there are 28 of these) and by the Conference of American Pharmaceutical Faculties. The Boards of Pharmacy not only have ample power to prescribe reasonable qualifications, but it is their duty to make these qualifications sufficient to afford some protection to the public welfare, thereby justifying the existence of the pharmacy laws and the restriction of the practice of pharmacy to those persons whom the Boards declare qualified. It is not the duty of the Boards of Pharmacy to supply cheap help.

At present the Association of Boards represents a little over one-third of the state boards of the country and therefore the decisions of a bare majority of its members voice the sentiments of but a few state authorities and that for the present time only.

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DECEMBER, 1906, TO FEBRUARY, 1907 NUMBER 3

NORTHWESTERN UNIVERSITY

THE LIBRARY OF THE UNIVERSITY OF ILLINOIS

BULLETIN
OF THE
SCHOOL *of* PHARMACY

UNIVERSITY OF ILLINOIS

PRESIDENT'S OFFICE.

See Special Announcement on Page 3

NORTHWESTERN UNIVERSITY BUILDING
LAKE AND DEARBORN STREETS, CHICAGO

NEXT SCHOOL SESSION BEGINS SEPTEMBER 23, 1907

Entered June 24, 1902, at Chicago, Illinois, as Second-Class Matter, under Act of Congress of July 16, 1894

FACULTY OF THE SCHOOL

1907-1908

Abram Winegardner Harris, Ph.D., LL.D., *President of the University.*

Oscar Oldberg, Pharm.D., Dean, *Professor of Pharmacy and Director of the Pharmaceutical Laboratories.*

William Edward Quine, M.D., LL.D., *Emeritus Professor of Physiology, Therapeutics and Toxicology.*

Harry Mann Gordin, Ph.D. (University of Berne, Switzerland), *Professor of Chemistry and Director of the Chemical Laboratories.*

Maurice Ashbel Miner, Pharm.M. (University of Michigan), *Assistant Professor of Pharmacy, in charge of the Manufacturing Laboratory. Curator.*

Charles Waggener Patterson, Sc.B., Ph.C. (Northwestern University), *Assistant Professor of Organic Analytical Pharmaceutical Chemistry, in charge of the Organic Chemical Laboratory. Registrar.*

Harry Kahn, Pharm.M. (University of Michigan), M.D. (Northwestern), *Assistant Professor of Physiology and Materia Medica.*

Eugene Shaw Willard, D.D.S. (Northwestern), *Assistant Professor of Bacteriology.*

Gerhard H. Jensen, Ph.D. (University of Chicago), *Instructor in Botany and Pharmacognosy.*

George Daniel Oglesby, Ph.G. (Northwestern), *Instructor in Pharmacy. In charge of the Dispensing Laboratory.*

William Henry Harrison, Ph.C. (Northwestern), *Instructor in the Chemical Laboratories.*

Charles Roland Clothier, Ph.C. (Northwestern), *Assistant in the Pharmaceutical Laboratory.*

Maynard H. Potter, Ph.C. (Northwestern), *Assistant in the Chemical Laboratories.*

Ernest Woollett, *College Clerk, Instructor in Bookkeeping and Business Methods.*

Mrs. Mary E. Davies, Ph.G., *Library Assistant.*

SPECIAL ANNOUNCEMENT

This school has for several years admitted students twice annually. It was believed that a large number of students would be benefited by having the opportunity to choose whether they would begin in September, at the beginning of the first semester, or in February, at the beginning of the second semester. All students received thirty hours' instruction weekly. The course for the degree of Graduate in Pharmacy extended through three semesters of eighteen weeks each. The students were given the option to attend eighteen weeks annually for three years, or thirty-six weeks in one year and eighteen weeks in the second year. All courses of study were taken up in precisely the same order by those who entered in February as by those who entered in September, all work being repeated for that purpose.

But the Faculty found that uniformity of procedure among the leading pharmaceutical schools is almost a necessity as a means of progress and the establishment of definite educational standards. Therefore, when other members of the American Conference of Pharmaceutical Faculties suggested a satisfactory uniform plan in the form of a proposed amendment to its by-laws, this school promptly and very willingly voted for that uniform plan.

Students who have already attended the school one or more semesters will, of course, have the opportunity to finish their course on the same plan upon which they began it.

All new students hereafter admitted must enter in September.

The course for the degree of Graduate in Pharmacy will consist of two annual sessions, beginning about September 23 and ending about April 15, embracing twenty-five weeks of active instruction, exclusive of the usual holiday recesses, registration days, examinations and other college functions which, strictly speaking, do not constitute instruction.

The course for the degree of Pharmaceutical Chemist will consist of two years of nine months each, terminating in the second or third week of June.

All students who devote their whole time to their school work will receive thirty hours' instruction, requiring their attendance five full days, weekly. Students who are unable to attend college without the opportunity to engage in concurrent drugstore work in order to earn a material part of their expense, will be assisted to find employment at wages sufficient to pay at least their living expenses, and a special time card has been worked out for their benefit, which will enable them to conveniently take all of the work embraced in the course by attending the college about twenty-three hours weekly from September to June each year for two years, the school work being exactly the same, both in kind and in amount, as that given to those students who give their whole time to their studies. The rates for tuition will be the same.

SPECIAL COLLEGE EDUCATION FOR PHARMACY

The following declarations were adopted by the Joint Conference of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties at Indianapolis in September, 1906:

"Special education for the practice of pharmacy is in this age a necessity and should as rapidly as possible be made compulsory, and the rules of the Boards of Pharmacy should be such as to promote and encourage it in all practicable ways.

"The special pharmaceutical education required should include substantial laboratory courses."

"We recommend to all concerned that the foregoing principles and standards be adhered to in any amendments to the pharmacy laws hereafter proposed, in order that national uniformity may be ultimately attained. The minimum requirements indicated, and especially the preliminary general education, should be increased from time to time as circumstances permit. We further strongly urge that the Boards of Pharmacy employ the discretionary powers already theirs under existing laws to improve the educational status of the pharmacists of the future."

Young men and women who propose to make pharmacy their life occupation should heed these signs of the times and begin right. Several states have already either made education in pharmacy schools compulsory or have adopted laws and rules under which substantial credit is given for it.

The School of Pharmacy of Northwestern University

THE UNIVERSITY was chartered by the state of Illinois in 1851. In 1905-06 its degree conferring departments had 2,560 students and its other schools 1,303, making a total of 3,863.

THE SCHOOL OF PHARMACY was established in 1886. Its average annual attendance for the past six years, including 1906-07, has been 225. From 20 to 25 states are annually represented in the classes.

It is located in NORTHWESTERN UNIVERSITY BUILDING, in the heart of Chicago, corner of Lake and Dearborn streets, easily accessible from any part of the city. The School of Pharmacy occupies the entire fourth floor, 160x180 feet.

The EQUIPMENT of the School is worth over $25,000 (1906).

The LABORATORIES are six. They are for the exclusive use of the pharmacy students, have a total floor space of 9,570 square feet, and are provided with 292 individual work tables, enabling that number of students to be all at work at one time. The *qualitative chemical laboratory* has a floor space of 1,800 square feet; the *quantitative chemical laboratory* 1,450 square feet; the *organic chemical laboratory* 1,900 square feet; *the laboratory for botany and pharmacognosy* 1,224 square feet; the *pharmaceutical manufacturing laboratory* 2,300 square feet; and the *dispensing laboratory* 900 square feet.

Several laboratories of other departments of the University are, in addition, open to the students of pharmacy.

The LECTURE ROOMS are two, one seating 184, the other 86.

The STUDENTS' ROOMS are two—one for men and one for women.

The MUSEUM contains over 2,000 specimens, including all kinds of drugs, manufactured pharmaceuticals, sick-room supplies, and other articles usually furnished by up-to-date, first-class pharmacies.

The LIBRARY occupies about 1,000 feet of floor space, and contains the most valuable reference works, worth about $3,500.

The FACULTY includes ten teachers and assistants, of whom eight have had practical experience in pharmacy. These teachers, with but one exception, give all their time and attention to their work in this School, having no other occupation and no other classes.

A FULL PROGRAM OF INSTRUCTION is given, carefully prepared with the view to occupy the student's time to his best advantage.

LABORATORY WORK, which is the most important feature of modern pharmaceutical education, constitutes about two-thirds of the total hours of instruction.

COURSE FOR THE DEGREE OF PH. G.—This occupies a total of 52 weeks, embracing over 500 hours of lectures and recitations and over 1,000 hours of laboratory work.

The minimum prescribed by the American Conference of Pharmaceutical Faculties is 600 hours' laboratory work and 500 hours' other instruction.

COURSE FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.—This requires nine months' work in each of two years, or four semesters. The instruction amounts to about 540 hours of lectures and recitations, and over 1,500 hours' laboratory work.

ADMISSION REQUIREMENTS.—One year's satisfactorily completed high school work, or its full educational equivalent, is required for admission to the course for the degree of Graduate in Pharmacy.

This is now required by law or by the rules of the Boards of Pharmacy in several states.

Students are not admitted under 17 years of age.

The only state of the United States which has a law fixing the minimum of preliminary general education for admission to the schools of pharmacy (New York) prescribes these requirements, and graduates of colleges, which do not require at least one year's high school work, have no standing in that state.

The same requirements have been adopted for the future by the National Association of Pharmacy Schools, the American Conference of Pharmaceutical Faculties, including twenty-six colleges, among which are nearly all of those founded prior to 1890, and all members of that association, with but two exceptions, are fulfilling those requirements now.

Of the students who entered Northwestern University School of Pharmacy during the past twelve months, one had a Bachelor's degree, 3 per cent. had had two or more years' college work, 40 per cent. were high school graduates, 20 per cent. had completed three years' work in high schools, 13 per cent. had completed 2 years, and 23 per cent. one year's high school work.

No school of pharmacy requires more than one year's high school work for admission to the course leading to the degree of Graduate in Pharmacy, but higher requirements may be confidently expected at an early day.

The American Pharmaceutical Association adopted at its annual meeting in 1906 the following declaration:

"A preliminary general education of not less than one year's satisfactorily completed high school work, or its educational equivalent, should be required as a prerequisite to the pharmaceutical experience or apprenticeship required for the licensing of registered pharmacists and assistant pharmacists and for admission to pharmaceutical schools."

This declaration was also adopted by the Joint Conference of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties.

POSITIONS FOR GRADUATES.—The demand for graduates of this School to occupy good positions is at all times greater than the supply. For some years past every graduate has been engaged before graduation day.

The occupations open to the alumni include: The drug business, wholesale and retail; professional pharmacy; positions as pharmacists in the Army and Navy and the Public Health and Marine-Hospital Service; hospital pharmacists; work as commercial and sanitary public analysts, and in the establishments of manufacturing pharmacists and chemists. Over twenty of the alumni have become teachers in pharmaceutical and medical schools.

Northwestern University School of Pharmacy is a member of the AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES, and is recognized in all states where any standards of efficiency have been established by law or by the Boards of Pharmacy.

BOARD AND ROOM.—Good board and room together can be secured near the School at from $4 to $6 per week. Students may also secure rooms and board separately. Information in regard to these matters and addresses of reliable and satisfactory private boarding places and furnished rooms will be supplied at the College. Good accommodations are plentiful, and satisfactory arrangements can be quickly made by each student immediately upon his arrival.

Students who are strangers to the city are, if desired, met upon their arrival and given every courtesy by the Northwestern University School of Pharmacy Secretary of the Y. M. C. A. and his aids, who have permanent offices in Northwestern University Building.

For further information address the Dean of
The School of Pharmacy, Northwestern University Building,
87 Lake Street, Chicago.

SUMMARY OF THE COURSES OF INSTRUCTION IN NORTHWESTERN UNIVERSITY SCHOOL OF PHARMACY.

The courses for the degree of Graduate in Pharmacy require the attendance of the student during fifty-two weeks, exclusive of the Christmas recess. The fifty-two weeks are divided equally between two years.

The courses for the degree of Pharmaceutical Chemist occupy seventy-two weeks—nine months each year for two years.

The amount of instruction embraced in the course for the degree of Graduate in Pharmacy is 1,500 hours, of which 1,000 hours are devoted to practical laboratory work.

The additional and more advanced courses for the degree of Pharmaceutical Chemist aggregate 560 hours.

All of the work included in the courses of instruction for the degrees conferred in this School is most carefully adapted to the special requirements of pharmacists. This practical adaptation of the courses to the occupation of pharmacy is rendered more effective by the fact that so great a number of the members of the faculty have themselves had extended and varied experience in that profession.

The important basis of the courses is the Pharmacopœia, which every well-trained pharmacist should be able to understand in all its parts.

The classes are drilled with especial care in all that pertains to the crowning function of all pharmacy—the best possible technical service to the public and the medical profession at the dispensing table.

Students are also given practical instruction designed to make them familiar with the unofficial drugs, preparations and supplies which physicians and the public now expect all first-class drug stores to be prepared to furnish.

It is the ambition of the Faculty of this School to make it in every way the most efficient practical training school for pharmacists.

The various courses of study and the time devoted to each department may be seen from the following descriptions:

COURSES FOR THE DEGREE OF GRADUATE IN PHARMACY.

A.—DEPARTMENT OF THEORY AND PRACTICE OF PHARMACY.

The time devoted to instruction in this department includes 275 hours for lectures and recitations and 400 hours for laboratory work; total, 675 hours.

1. *Weights and Measures and Pharmaceutical Arithmetic.*—The metric system and the customary weights and measures. Specific gravity. Actual practice in the computation of

doses, the making, mixing and dilution of solutions and mixtures, standardization, percentage solutions, etc. Calculations of proportions, and other necessary arithmetical problems connected with practical pharmaceutical and chemical work.

Two hours weekly during twenty-five weeks.

Mr. George D. Oglesby.

2. *General Preparatory Course on the Materials* employed in the preparation of medicines. Study of the general pharmaceutical properties of the most important constituents of vegetable drugs, such as cellulose, starch, pectin, mucilage, albumin, fixed oils and fats, volatile oils, resins, tannin, bitter principles, glucosides, alkaloids, etc. These several classes of drug constituents are reviewed sufficiently to render the practical study of pharmaceutical processes intelligent and effective.

About eighteen lectures. Professor Oldberg.

3. *General Pharmaceutical Processes and Manipulations,* such as powdering, solution, filtration, evaporation, crystallization, precipitation, sublimation, distillation, maceration, digestion, percolation, dialysis, etc.

About sixteen lectures and recitations.

Mr. George D. Oglesby.

4. *Preparatory Laboratory Course,* familiarizing the student with apparatus, processes and materials. This course of practice in chemical and pharmaceutical operations, includes the making of many of the simpler preparations.

Two laboratory periods weekly, of three hours each, during twenty-five weeks. Prof. Maurice A. Miner.

5. *Review of all Classes of Pharmaceutical Preparations* not made by chemical processes, such as powders, triturations, masses, troches, tablets, pills, capsules, ointments, cerates, plasters, suppositories, waters, mucilages, syrups, emulsions, mixtures, infusions, decoctions, tinctures, wines, fluid extracts, extracts, oleoresins, resins. General methods of preparation.

About forty lectures and recitations.

Professor Oldberg.

6. *The Pharmacopœia of the United States.*—Its general character, scope and functions, and its technical nomenclature.

About eighteen lectures and recitations.

Professor Oldberg.

As the Pharmacopœia is the most important of all books to the pharmacist, and the established legal standard by which all medicinal substances enumerated in it must be judged, it is used as a general guide in all departments of study in this School, especially in pharmacy, pharmacognosy, pharmaceutical testing and drug assaying.

Every student is expected to own and become familiar with this law book of the apothecary.

7. *The Chemical Pharmaceutical Preparations.*—Applied inorganic pharmaceutical chemistry. The basic principles and the most important methods applicable to the preparation of inorganic

pharmaceutical chemicals and preparations, and their practical pharmacy.

About thirty-four lectures and recitations.

PROFESSOR OLDBERG.

8. *Laboratory Practice in Manufacturing Inorganic Chemical-Pharmaceutical Preparations.*—A great variety of examples are presented, and the students are thereby made familiar with the character and properties of the substances classed as the inorganic pharmaceutical chemicals by the most effective method possible.

Two laboratory periods weekly of three hours each for twenty-five weeks. PROF. MAURICE A. MINER.

9. *The Practical Pharmacy of Individual Organic Drugs.*—The pharmaceutical character, chemical constituents and preparations of all important vegetable drugs. The individual extracts, fluid extracts, tinctures and other preparations.

About thirty-four lectures and recitations.

PROFESSOR OLDBERG.

10. *The Prescription Department.*—The character and construction of prescriptions. How to read and interpret them. Detection of defects, errors and incompatibilities. The dispensing department and its practical problems.

About sixteen lectures and recitations.

PROFESSOR OLDBERG.

11. *Duties and Responsibilities of Pharmacists.*—Laws governing their technical professional work, and the sale of drugs and poisons. The relations of pharmacists to the medical profession and to the community. Ethics.

About sixteen lectures and recitations.

PROFESSOR OLDBERG.

12. *The Art of Dispensing.*—A practical laboratory course, with accompanying lectures and recitations. It is now generally conceded that a systematic course of laboratory training in the art of making extemporaneous pharmaceutical preparations and in compounding and dispensing medicines must be a fundamental and crowning feature of any first-class school of Pharmacy. In the Dispensing Laboratory of the School of Pharmacy of Northwestern University (the first workshop of its kind) the student sees and learns to use an outfit of dispensing apparatus many times as extensive as can be found in many of the best drug stores together. Every student is required to make a great variety of extemporaneous preparations. The lessons are systematically prepared or selected with the view to include all important phases of work at the dispensing table with all kinds of materials and by all the different methods practiced. A practical experimental study of incompatibilities is included in this course.

About sixteen lectures and one hundred hours of laboratory drill. MR. GEORGE D. OGLESBY.

13. *Commercial Pharmacy.*—The miscellaneous supplies legitimately furnished by modern pharmacies, such as unofficial medicinal preparations and products; surgical instruments, bandages, dress-

ings, plasters, etc.; sanitary and dietetic and other sick-room supplies, including antiseptics and disinfectants; and other similar articles which the medical profession and the public expect all first-class pharmacies to furnish.

These lines of goods, including specialties, are described and shown to the classes, ample exhibits being provided at the School for that purpose.

Samples of the finished products of manufacturers of pharmaceutical products, such as coated pills, capsules, troches, fluid and solid extracts, elixirs, and other classes of preparations are also exhibited and discussed.

The object of this course is to familiarize the student, as far as possible, with the supplies of this kind which he must handle as a pharmacist and about which he must be well enough informed to perform that duty intelligently.

About sixteen lectures. MR. GEORGE D. OGLESBY.

14. *Business Training.*—A course of class exercises and practice designed to teach the student how the most common and essential commercial affairs connected with the drug business are conducted, including bookkeeping. Students are taught the nature and uses of invoices, bills, statements, orders, receipts, the banking business of the druggist, bills receivable and payable, drafts, notes, checks; they learn something of the meaning and uses of pricelists and discounts, credits, collections, remittances, consignments, taking stock, partnership, commission, insurance, interest, taxes, contracts, leases, bills of sale, etc.

About sixteen hours.

MR. ERNEST WOOLLETT.

B.—DEPARTMENT OF GENERAL INORGANIC, ORGANIC AND ANALYTICAL CHEMISTRY.

The total instruction hours in the courses for the degree of Graduate in Pharmacy are, in this department, 525 hours, of which 150 hours are given to lectures and recitations and 375 hours to laboratory work.

1. *General and Inorganic Chemistry.*—Theoretical and practical chemistry, including inorganic qualitative and quantitative analysis, with especial reference to the needs of the pharmacist in the intelligent interpretation and application of the text and tests of the Pharmacopœia.

Three hours weekly of lectures and recitations and 225 hours laboratory work.

PROFESSOR GORDIN AND MR. WILLIAM H. HARRISON.

2. *Organic Chemistry.*—A course sufficient to enable the student to understand the text of the Pharmacopœia describing organic compounds and to perform intelligently the tests and assay methods prescribed in it.

Seventy-five lectures and recitations through twenty-five weeks.

PROFESSOR GORDIN.

3. *Drug Assaying and Organic Pharmaceutical Testing.*—Pharmacopœial processes of valuation and standardization of the

most important drugs and preparations, such as opium, cinchona, nux vomica, etc., etc.

Two laboratory periods weekly of three hours each through twenty-five weeks.

PROF. CHARLES W. PATTERSON.

C.—DEPARTMENT OF BOTANY, MICROSCOPY AND PHARMACOGNOSY.

The instruction embraces twenty-five lectures and 200 hours of laboratory work.

1. *Pharmaceutical Botany.*—The organs, tissues and microscopical structure of plants and plant drugs—a necessary preparation for the study of vegetable drugs.

One lecture and four hours' laboratory work weekly through twenty-five weeks.

DR. GERHARD H. JENSEN.

2. *Pharmacognosy.*—Study of the vegetable drugs and their powders, with especial reference to the intelligent interpretation of the descriptions given in the Pharmacopœia for the identification of such drugs and to enable the student to learn to judge correctly of their quality.

Four hours' laboratory work weekly, with lectures.

DR. GERHARD H. JENSEN.

D.—DEPARTMENT OF PHYSIOLOGY AND MATERIA MEDICA.

One hundred lectures.

1. *Physiology.*—A course intended to sufficiently prepare the student for the course in Materia Medica, or Pharmacology.

Fifty lectures through twenty-five weeks.

PROF. HARRY KAHN.

2. *Materia Medica.*—The properties, action, uses and doses of official drugs, including so much of therapeutics and toxicology as is indispensable to the safe practice of pharmacy.

Fifty lectures through twenty-five weeks.

PROF. HARRY KAHN.

COURSES FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.

All the courses for the degree of Graduate in Pharmacy, and, in addition:

1. *The Pharmacopœias of the World.*—Comparative study of the pharmacopœias of the world, their scope, style of construction, materia medica, chemistry, pharmacy, nomenclature, preparations and other important features.

2. *Laboratory Practice in the Preparation of Organic, Pharmaceutical and Chemical Preparations.*

The production of natural plant substances, such as alkaloids and glucosides, and of the more common organic chemical preparations. Among the products made are, for instance, salicin, piperin, aloin, amygdalin, berberine, ether, chloroform, iodoform, acetic ether, nitrous ether, methyl salicylate, etc.

3. *Quantitative Analysis, Chiefly Gravimetric.*—This laboratory course begins with the simple fundamental operations characteristic of the general method and proceeds to the special processes involved in the actual gravimetric determination of inorganic substances.

4. *Urine Analysis, Qualitative and Quantitative.*—The detection and determination of constituents of urine, which are of importance in the diagnosis of disease.

5. *Special Course on Alkaloids, Glucosides, etc.*—A course of about eighteen lectures upon the alkaloids, glucosides and other definite chemical compounds contained in drugs and other plant substances. Their composition, separation, identification, properties and relationships.

6. *Advanced Pharmaceutical Testing.*—Practice in the separation, identification and estimation of alkaloids. Further work in the official methods of assaying drugs and preparations. The examination of organic substances for the detection of impurities and adulterations. Practical study of methods of taking melting points and boiling points. Quantitative estimations of certain solutions and preparations, such as formaldehyde, etc.

7. *Food and Sanitary Analysis.*—The examination of water to determine its potableness and fitness for household uses and the examination of milk, butter, cheese, beverages, and food products generally, and such other work as is usually required of public analysts for sanitary purposes.

8. *Commercial Microscopy.*—A course designed to afford the requisite training for the duties of the Pharmaceutical Chemist and Public Microscopist, including the examination of powdered drugs, spices, foodstuffs, etc. Specially prepared cross and longitudinal sections of whole specimens are supplied for comparison with the tissue elements as found in powders. A thorough study of the various kinds of starch is made. Hairs and textile fibers are studied. Training is given in microtechnique, including micrometry and work with the camera lucida and polariscope. Special methods for the isolation and determination of the structural elements of woods, stems, leaves, barks, roots, rhizomes, seeds, fruits, glands and spores.

9. *Bacteriology.*—Lectures and laboratory work six hours weekly through about fifteen weeks. The most approved methods are taught.

Bacteria in health and disease. Culture media. Culture methods. Staining. Identification of some of the more common bacteria of earth, air and water. Toxins and antitoxins.

The course is a practical one, enabling the student to fit himself to do successfully the bacteriological work ordinarily required for medical diagnosis and for sanitary purposes.

The student may, to some extent, elect the courses he prefers, the total amount of work to be not less than 560 hours, in addition to the work embraced in the course for the degree of Graduate in Pharmacy.

THE PHARMACY LAWS.

Several new laws have been enacted during the past year. One of the most vicious of the new laws is that of Iowa, which demands that graduates in pharmacy shall be registered *without being required to prove that they have had any practical experience.* At the same time that law does not exempt graduates from the Board examination. That graduation from a reputable school of pharmacy should mean much in the way of evidence of fitness for registration, every intelligent man will admit; but it should never excuse anyone from the necessary practical experience in drug stores. Graduates might well be exempt from examination, except in prescription reading and dispensing, provided the Boards of Pharmacy adopt rational rules governing the recognition of pharmaceutical schools, so that only the graduates of proper schools can be granted that exemption; but the schools are evidently not asking for it.

Many of the pharmacy laws confer powers upon the Boards, which, when utilized in the right manner, will encourage pharmaceutical education. These discretionary powers are at last beginning to bear good fruit.

It will be seen that the West takes the lead in requiring reasonably good education for pharmacy, as the conditions in Michigan, Wisconsin and South Dakota indicate. Efforts along this line seem, so far, to have been abortive in Illinois, Kansas, Iowa and Minnesota, but success must ultimately come.

The most important part of the training of a pharmacist is sufficient practical experience of the right kind in a pharmacy of the right kind. There is not a respectable school of pharmacy that does not unequivocally subscribe to that proposition.

Before the advent of pharmacy laws and Boards of Pharmacy the only generally recognized evidence of fitness to practice pharmacy was a diploma issued by a school of pharmacy. It was then right and proper that drug-store experience should be required before graduation. Twenty years ago there were only twelve schools of pharmacy in the United States. All but one of them required drug-store experience preceding graduation. Now only four of those twelve schools refuse to confer any pharmaceutical degree without that requirement. The reason is obvious. The Boards of Pharmacy are the proper authorities to see to it that all applicants for registration have had the requisite amount of practical experience before they issue the certificates. That is a direct, simple and effective method. The function of the colleges is to teach, and that only. They cannot and should not be asked to investigate or require drug-store experience of their students, for they cannot do that properly, it is not an educational function, and it *is* the business of the Boards. The Boards cannot and should not demand that the colleges require drug-store experience for graduation; they can and should give due consideration to good college education in pharmacy, as something quite distinct from drug-store experience, and to good drug-store experience as something quite distinct from any college course. The applicant for registration should have *both* college training and drug-store training, and the Boards can regulate both, but no diploma from any college, whatever its requirements for graduation, can be sufficient evidence of drug-store training, and no drug-store training is sufficient evidence of the systematic technical education, which it is the sole mission of the schools to supply.

Requirements for registration and license in pharmacy as to age, practical drug-store experience, special education in schools of pharmacy, and examinations. Corrected to January 1, 1907.

ALABAMA—Registered Pharmacists must be eighteen years of age and must have two years' drug-store experience. Graduates of schools of pharmacy requiring four years' drug-store experience are registered without examination. All others are examined.

Assistants and apprentices are not recognized by the law.

ARIZONA—Registered Pharmacists must be either graduates of "legally constituted colleges of pharmacy," or must pass the Board examination. They must have four years' drug-store experience. No age qualification is prescribed.

Assistants must be eighteen years, have two years' experience, and pass the state examination.

Apprentices are not provided for.

ARKANSAS—Registered Pharmacists must have three years' drug-store experience, including time spent at a recognized College of Pharmacy.

Graduates of Schools of Pharmacy that require three years' drug-store experience before granting diplomas are registered without examination.

All other applicants are registered on examinations only. But the examination questions of other State Boards, where the rating obtained is 70 per cent. or over, are favorably considered by this Board and adopted as *its own examination.*

CALIFORNIA—Registered Pharmacists (Licentiates in Pharmacy) must have five years' drug-store experience.

Assistant Pharmacists are required to prove three years' drug-store experience.

All candidates for both grades must pass examination, except persons who have had twenty years' drug-store experience, and graduates in pharmacy, who have had eighteen years' experience.

Apprentices are registered. They are required to have a completed grammar school education. The drug-store experience required of licentiates and assistants counts only after date of apprentice registration.

Matriculates attending reputable schools of pharmacy are registered as apprentices "upon such fact being shown."

COLORADO—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have two years' drug-store experience.

All must pass examination.

Apprentices are not recognized.

CONNECTICUT—Registered Pharmacists must have three years' drug-store experience and must pass examination.

Assistants and Apprentices are not mentioned in the law.

DELAWARE—Registered Pharmacists must be twenty-one years of age and have three years' drug-store experience.

Assistants must be eighteen years of age and have two years' experience.

Graduates of schools of pharmacy requiring four years' drug-store experience for graduation are registered without examination; all others are examined. The intelligent manner in which the law is administered is indicated by the report of the Secretary of the Board to the effect that "departments of universities" are not recognized in that state.

Apprentices are not mentioned.

DISTRICT OF COLUMBIA—A new pharmacy law was passed by Congress in 1906. It provides that applicants for license as pharmacists in the District of Columbia "shall have had at least *four* years' experience in the practice of pharmacy, or shall have served *three* years under the instruction of a *regular* licensed pharmacist, and any applicant who has been graduated from a school or college of pharmacy, recognized by said Board as in good standing, shall be *entitled to examination* upon presentation of his diploma."

The enforcement of this remarkable law is entrusted to medical men—the Board of Supervisors of Medicine and Pharmacy—the Board of Pharmacy having been reduced to a mere committee of examiners. Efforts to learn whether four years' or three years' practical experience is required elicited the information that all candidates must prove four years' experience. As everybody is "entitled to examination," non-graduates, as well as graduates, the mention of schools "in good standing" is peculiar.

Pharmacists must be twenty-one years. All candidates must pass the examination. Assistants and Apprentices are not mentioned.

FLORIDA—Registered Pharmacists must be eighteen years of age and have three years' drug-store experience. Time of attendance at a school of pharmacy is deducted from the three years' drug-store experience required for registration. All are examined.

Assistants and Apprentices are not recognized by the law.

GEORGIA—Registered Pharmacists must have three years' drug-store experience, unless they are Graduates in Pharmacy, in which case they are not required to have any drug-store experience. All must pass the examination.

Assistants and Apprentices are not recognized by the law.

IDAHO—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

All candidates must pass the Board examination.

The law makes no mention of apprentices.

ILLINOIS—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have three years' drug-store experience.

Apprentices must be fifteen years of age.

All candidates for registration, whether Registered Pharmacists, Assistant Pharmacists or Apprentices, are examined by the Board.

The time of regular attendance at a School of Pharmacy is credited on the amount of experience required for registration in the grade of Assistant Pharmacists, but is not deducted from the four years' experience required for full registration. No credit is given for any drug-store experience acquired in Illinois prior to the apprenticeship registration.

INDIANA—Registered Pharmacists and Assistants must be eighteen years of age; but Registered Pharmacists must have four years' drug-store experience and Assistant Pharmacists two years.

Time of attendance at Pharmaceutical Schools is deducted from the experience required. All candidates must pass the Board examination.

The law makes no mention of apprentices.

INDIAN TERRITORY—Registered Pharmacists must be twenty-one years of age, have had three years' experience, and must pass the examination. Graduates of schools which are members of the American Conference of Pharmaceutical Faculties who can prove two years' experience are exempt from examination.

IOWA—Registered Pharmacists must be twenty-one years of age and Assistant Pharmacists eighteen years.

All must pass the Board examination. including graduates. But the Graduates of Schools holding membership in the American Conference of Pharmaceutical Faculties and giving two years' courses with thirty-six weeks' instruction annually, are not required to have any drug-store experience.

Apprentices are not mentioned.

KANSAS—The law explicitly demands that all candidates for license as Registered Pharmacists must have had four years' drug-store experience. Graduates of approved pharmaceutical schools may be exempt from examination at the discretion of the Board, but the Board has no power to exempt them from the prescribed practical experience.

The Board of Pharmacy has no list of approved schools, nor any rules governing their decision as to what schools shall be approved. Reports of statistics were called for by the Board nearly a year ago, which indicated that only courses occupying thirty-six weeks annually for two years may be approved; but no decision seems to have been reached.

Assistant Pharmacists must have two years' experience.

Apprentices are not mentioned.

KENTUCKY—Registered Pharmacists must have three years' experience and must pass the Board examination.

Assistants and Apprentices are not recognized by the law.

LOUISIANA—Registered Pharmacists must be twenty-one years of age and Assistants eighteen years of age. Registered Pharmacists must prove four years' drug-store experience; Assistants, two years. All must pass the examination.

Apprentices are registered. They must have a "common school education."

MAINE—A Registered Pharmacist must have three years' experience or be a graduate of some regularly incorporated Medical College or College of Pharmacy. Graduates are registered without experience.

Assistant Pharmacists must be eighteen years of age and have two years' drug-store experience, or have completed the junior year in a Pharmacy Department of any incorporated College.

All are examined.

Apprenticeship is not regulated by the law.

MARYLAND—Pharmacists must be twenty-one years of age and have four years' drug-store experience.

All candidates for registration are examined.

Apprenticeship is not regulated by the law.

MASSACHUSETTS—Registered Pharmacists must have three years' drug-store experience and must pass the Board examination.

One-half of the time spent in a "recognized" College of pharmacy may be deducted from the three years' experience.

Assistant Pharmacists and Apprentices are not registered.

MICHIGAN—Registered Pharmacists must be twenty-one years of age, have four years' drug-store experience, and a preliminary general education equivalent to two years' high school work, and must pass the Board examination. If the applicant has attended a school of pharmacy, the time of attendance at such school is deducted from the four years' drug-store experience, provided the work at the school of pharmacy amounts to two full school years of not less than nine months each, with not less than fifteen hours' laboratory work and ten hours of other instruction weekly.

Assistant Pharmacists are called Registered Druggists. They must be eighteen years of age, have had two years' high school work, and two years' drug-store experience, and must pass the Board examination. If the applicant has attended a school of pharmacy the time of attendance at such school, not exceeding one year, is deducted from the three years' practical experience required, but no credit is given for less than one full school year of not less than nine months, with not less than fifteen hours' laboratory work and ten hours of other instruction weekly.

Apprenticeship is not regulated.

MINNESOTA—Registered Pharmacists must be twenty-one years and must have had four years' shop training; but graduates of schools of pharmacy giving courses of instruction which include "not less than twelve months' laboratory work" may have the shop-training requirement reduced to two years.

Assistant Pharmacists must be eighteen years of age and prove two years' shop experience.

Candidates for both grades of licenses are first examined upon their general education, and, if they pass that examination satisfactorily, they are then allowed to take the special examinations.

Qualifications for apprenticeship are not mentioned.

MISSISSIPPI—Registered Pharmacists are licensed only upon passing an examination before the Board of Pharmacy.

Age and drug-store experience are not referred to.

Assistants and Apprentices are not mentioned in the law.

MISSOURI—Registered Pharmacists must be eighteen years of age and have three years' drug-store experience.

All must pass the Board examination, except graduates of Pharmaceutical Colleges requiring four years' practical experience before graduation.

Assistant Pharmacists and Apprentices have no legal existence.

MONTANA—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have two years' drug-store experience.

Time of attendance at Pharmaceutical Schools is deducted from the experience required. All must pass the Board examination.

Apprentices are not mentioned in the law.

NEBRASKA—Registered Pharmacists must be eighteen years of age and have three years' drug-store experience, but the net time devoted to laboratory courses in Pharmaceutical Schools is deducted from the drug-store experience required.

All must pass the Board examination.

Assistants and Apprentices are not registered.

NEVADA—No drug-store experience is required. Applicants for registration must pass the Board examination, except graduates of approved Pharmaceutical Schools and licentiates from other states.

Assistants and Apprentices are not mentioned.

NEW HAMPSHIRE—Persons engaging in the drug business on their own account must pass an examination by the Commissioners of Pharmacy.

The law makes no mention of age or experience required of such persons, but they must be "skilled and learned in pharmacy." They are called "Pharmacists."

"Registered Assistants" are required by law to be not less than eighteen years of age, to have at least two years' drug-store experience and pass to the "minor examination."

No qualifications are prescribed for Apprentices.

NEW JERSEY—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have three years' drug-store experience.

Time of attendance at Pharmaceutical Schools is deducted from the experience required, but not less than two years' shop experience must be proven by all candidates. All must pass the Board examination.

Apprentices are not mentioned in the law.

NEW MEXICO—All candidates for license are examined and if found qualified are registered. Age and experience are not specified.

NEW YORK—Licensed Pharmacists must be at least twenty-one years of age and have had four years' practical experience and pass satisfactory examination.

Licensed Druggists must have had three years' practical experience and pass a satisfactory examination.

A Licensed Druggist may conduct a drug store in a village or place with less than 1,000 inhabitants and may also be in temporary charge of a licensed pharmacy, except in the city of New York, where they are not recognized.

All applicants for registration as Licensed Pharmacists must be graduates of schools of pharmacy registered by the Education Department of the state as complying with the standards established by the law and the rules of the Board.

One year's high school work is demanded by the law as the minimum of preliminary general education.

Apprentices in pharmacy must be registered within three months after the beginning of their employment as such.

No certificates of colleges or of states are recognized.

Graduates of schools or colleges of pharmacy which do not require at least one year's high school work for admission, have no standing under the New York law.

NORTH CAROLINA—Registered Pharmacists must have three years' drug-store experience and must pass the Board examination.

Assistants and Apprentices are not registered.

The Board deducts from the drug-store experience not to exceed one year of the time of attendance at a reputable school of pharmacy giving courses of instruction, including not less than 600 hours of laboratory work and 500 hours of other instruction. This is the standard of the American Conference of Pharmaceutical Faculties.

NORTH DAKOTA—Registered Pharmacists must be twenty-one years of age and have four years' experience.

Assistant Pharmacists must be eighteen years of age and have two years' drug-store experience.

One-half of all time devoted to attendance at an "approved" School of Pharmacy is deducted from the drug-store experience required.

All candidates must pass the examination.

Apprentices are registered; they must have a completed grammar school education, and be fifteen years old.

OHIO—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have two years' drug-store experience.

Apprentices are not mentioned in the law.

Time of attendance at Pharmaceutical Schools is deducted from the drug-store experience required; but not to exceed two years for the grade of Registered Pharmacist, and not to exceed one and one-half years for the grade of Assistant Pharmacist.

The credit given for attendance at a school of pharmacy amounts to the actual resident attendance plus one-third; but no deduction is made from the four years' experience, which Registered Pharmacists must have, unless the applicant is a graduate. Only schools requiring one year's high school work for admission are recognized in Ohio.

All candidates must pass the Board examination.

Any person, without regard to preparatory education, may be employed as an apprentice.

OKLAHOMA—Registered Pharmacists must be twenty-one years and have four years' experience.

Assistants must be eighteen and have two years' experience.

Graduates of such schools as the Board may recognize, including only those requiring four years' drug-store experience for graduation, are registered without examination. All others are examined.

Grammar school graduation required.

Apprentices not mentioned.

OREGON—Registered Pharmacists must have three years' drug-store experience and Assistant Pharmacists two years' drug-store experience.

No age limit is fixed for Registered Pharmacists, but Assistants must be eighteen years of age.

All must pass the Board examination.

Any person, without regard to preparatory education, may be employed as an apprentice.

PENNSYLVANIA—Registered Pharmacists must have four years' drug-store experience. Candidates for license as Registered Pharmacists must be graduates of chartered reputable schools of pharmacy, and the Board recognizes as such the schools holding membership in the American Conference of Pharmaceutical Faculties.

Assistant Pharmacists must have two years' drug-store experience.

All must pass the Board examination.

Any person, without regard to preparatory education, may be employed as an apprentice.

RHODE ISLAND—Registered Pharmacists must have three years' drug-store experience.

Assistant Pharmacists must also have three years' drug-store experience.

All are examined.

Any person, without regard to preparatory education, may be employed as an apprentice.

SOUTH CAROLINA—Registered Pharmacists must pass the Board examination, unless graduates of Pharmaceutical Schools approved by the Board. Three years' drug-store experience is required by the Board. Actual time of attendance at the school of pharmacy is deducted from the three years' drug-store experience.

Assistants and Apprentices are not registered.

SOUTH DAKOTA—Registered Pharmacists must be eighteen years of age and have three years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have one year's drug-store experience.

Graduates of approved Pharmaceutical Schools are credited with two years of the experience required.

All the candidates must pass the Board examination.

The Board of Pharmacy of South Dakota requires for admission to its examinations a general education at least equivalent to one year of completed high school work.

TENNESSEE—Registered Pharmacists must be twenty-one years of age and have four years' drug-store experience.

Assistant Pharmacists must be eighteen years of age and have two years' drug-store experience.

Attendance at "reputable" Pharmaceutical Schools is deducted from the experience required. All must pass the Board examination.

Any person, without regard to preparatory education, may be employed as an apprentice.

TEXAS—Registered Pharmacists must be twenty-one years of age and have three years' drug-store experience.

Assistant Pharmacists must be eighteen years of age, but are not required to have any drug-store experience.

All must pass the Board examination, except Graduates in Pharmacy, who must have had two years' experience.

Any person, without regard to preparatory education, may be employed as an apprentice.

UTAH—Registered Pharmacists must be eighteen years of age and have four years' drug-store experience, except graduates, who are not required to prove more than three years' experince.

Assistant Pharmacists must have two years' drug-store experience.

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All candidates must pass the Board examination.
Apprentices are not mentioned in the law.

VERMONT—Registered Pharmacists must be twenty-one years of age and have three years' drug-store experience.

Assistant Pharmacists are not required to have any drug-store experience.

All candidates must pass the Board examination. "Not much credit is given for college diplomas."

Apprentices are not mentioned in the law.

VIRGINIA—Registered Pharmacists must be 21 years of age and have four years' drug-store experience.

Assistant Pharmacists must be 18 years of age and have two years' drug-store experience.

All candidates for both grades are examined.

Apprentices are not mentioned in the law.

WASHINGTON—All candidates must pass the Board examination. Registered Pharmacists must prove three years' drug-store experience.

Assistant Pharmacists must be at least eighteen years of age, and must have two years' drug-store experience.

Apprentices are registered and must be grammar school graduates.

WEST VIRGINIA—Registered Pharmacists must be eighteen years of age and have three years' drug-store experience, and must pass the Board examination, except graduates of Pharmaceutical Schools requiring four years' drug-store experience for graduation.

Apprentices are not mentioned in the law.

Time of college attendance, not to exceed one year, is deducted from the three years' drug-store experience required for registration.

WISCONSIN—Applicants for certificates as Registered Pharmacists must be twenty-one years of age and prove five years' experience, two years of which must have been spent in drug stores, two years in a "recognized" school of pharmacy, and the remaining year either in college or drug store.

Applicants for certificates as Registered Assistant Pharmacists must be eighteen years old and have two years' experience, of which one year must be in a drug store, and one year in a "recognized" school of pharmacy.

All schools of pharmacy holding membership in the American Conference of Pharmaceutical Faculties are recognized, provided they give two years' courses, with not less than thirty-two weeks' instruction annually.

All must furnish proof of having had at least one year's high school work, and all must pass the Board examination.

WYOMING—Registered Pharmacists must have two years' drug-store experience and must pass the Board examination, except graduates of Pharmaceutical Schools approved by the Board.

Assistants and Apprentices are not registered.

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BULLETIN
OF THE
SCHOOL *of* PHARMACY

NORTHWESTERN UNIVERSITY BUILDING
LAKE AND DEARBORN STREETS, CHICAGO

Next School Session Begins September 23, 1907

Entered June 24, 1902, at Chicago, Illinois, as Second-Class Matter, under Act of Congress of July 16, 1894.

NORTHWESTERN UNIVERSITY

Evanston — Chicago

The University comprises the following departments of instruction, each having a distinct Faculty:

THE COLLEGE OF LIBERAL ARTS, in Evanston,
Founded in 1851, opened in 1855.

THE MEDICAL SCHOOL, in Chicago,
Founded in 1859.

THE LAW SCHOOL, in Chicago.
Founded in 1859.

THE SCHOOL OF PHARMACY, in Chicago,
Founded in 1886.

THE DENTAL SCHOOL, in Chicago,
Founded in 1887.

THE SCHOOL OF MUSIC, in Evanston,
Organized in 1895.

The following non-degree conferring departments are maintained by the University:

THE ACADEMY, at Evanston,
Established in 1860.

GRAND PRAIRIE SEMINARY, at Onarga, Illinois,
Founded in 1863.

THE ELGIN ACADEMY, at Elgin, Illinois,
Chartered in 1839, opened in 1856.

Garrett Biblical Institute, a theological school authorized by its charter to confer degrees in divinity, is established on its own foundation and under separate management. The buildings of the Institute are on the University Campus in Evanston, and the school is in close co-operation with the University.

The Norwegian Danish Theological School in Evanston is affiliated with the Institute.

The Swedish Theological Seminary is an independent school located on the University Campus in Evanston.

The Cumnock School of Oratory is conducted on the University Campus in Evanston.

The Interstate School of Correspondence in Chicago is affiliated with the University, its certificates in academic courses being accepted at their face value toward meeting the entrance requirements in any department.

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Junior Program for the Year 1907-08

School Year begins September 23, 1907

	Pharmaceutical Chemist 9 mo.		Graduate in Pharmacy 6 mo.		Graduate in Pharmacy 9 mo.	
Monday	9-10	Pharmacy	9-10	Pharmacy		
	10-11	Pharmacy	10-11	Pharmacy	10-11	Pharmacy
	11-12	Chemistry	11-12	Chemistry	11-12	Chemistry
	1- 2 2- 3 3- 4	Chemical Laboratory	1- 2 2- 3 3- 4	Pharmaceutical Laboratory	1- 2 2- 3 3- 4	Chemical Laboratory
Tuesday	9-10	Pharmacy	9-10	Pharmacy		
	10-11	Physiology	10-11	Physiology	10-11	Physiology
	11-12	Chemistry	11-12	Chemistry	11-12	Chemistry
	1- 2 2- 3 3- 4	Pharmaceutical Laboratory	1- 2 2- 3 3- 4	Chemical Laboratory	1- 2 2- 3 3- 4	Pharmaceutical Laboratory
Wednesday	9-10	Botany	9-10	Botany		
	10-11	Pharmacy	10-11 11-12	Microscopical Laboratory	10-11	Pharmacy
	11-12	Chemistry			11-12	Chemistry
	1- 2 2- 3	Microscopical Laboratory	1- 2 2- 3 3- 4	Chemical Laboratory		
Thursday	10-11	Physiology	10-11	Physiology	10-11	Physiology
	11-12	Pharmacy	11-12	Pharmacy	11-12	Pharmacy
	1- 2 2- 3 3- 4	Chemical Laboratory	1- 2 2- 3 3- 4	Pharmaceutical Laboratory	1- 2 2- 3 3- 4	Chemical Laboratory
Friday	10-11 11-12	Microscopical Laboratory	10-11	Pharmacy		
			11-12	Chemistry		
	1- 2 2- 3 3- 4	Pharmaceutical Laboratory	1- 2 2- 3 3- 4	Chemical Laboratory	1- 2 2- 3 3- 4	Pharmaceutical Laboratory
Saturday	9-10 10-11 11-12	Chemical Laboratory	9-10 10-11	Microscopical Laboratory	10-11 11-12 12- 1	Chemical Laboratory

UNIVERSITY OF ILLINOIS

PRESIDENT'S OFFICE.

OFFICERS OF THE BOARD OF TRUSTEES OF NORTHWESTERN UNIVERSITY.

William Deering,
Honorary President.

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1907-1908.

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GERHARD H. JENSEN, PH.D. (University of Chicago), *Instructor in Botany and Pharmacognosy.*

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BULLETIN

OF THE

SCHOOL OF PHARMACY

OF

NORTHWESTERN UNIVERSITY

MARCH TO MAY, 1907

SPECIAL ANNOUNCEMENT.

For several years this school has admitted students semi-annually in the belief that a large number of students would benefit by the opportunity of choosing whether to commence the course at the beginning of the first semester in September or at the beginning of the second semester in February. The course for the degree of Graduate in Pharmacy extended through three semesters of eighteen weeks each and the students were given the option of attending three semesters consecutively or otherwise. All courses of study were repeated semi-annually and consequently the work was taken in the same order whether the student entered in September or in February. All students received thirty hours' instruction weekly. Students taking the course for the degree of Pharmaceutical Chemist attended four semesters or two years of nine months each.

Uniformity of procedure among the leading pharmaceutical schools is a necessity as a means of establishing definite educational standards and when other schools in the American Conference of Pharmaceutical Faculties suggested a satisfactory uniform plan in the form of a proposed amendment to its by-laws the Faculty of this School promptly and very willingly voted to concur and this plan was finally adopted. Consequently all colleges or schools of pharmacy belonging to the Conference are now required to give courses of instruction embracing not less than five hundred hours of lectures and recitations and not less than six hundred hours of laboratory work, and to include this work in two annual sessions of not less than twenty-five weeks each, and to demand not less than one year's completed high school work for admission.

This School has for two years required a year of high school work for entrance and gives an amount of work far in excess of the minimum the Conference requires. The Graduate in Pharmacy course in this School consists of five hundred hours of lectures and recitations and a thousand hours of laboratory work. The only change, therefore, that will take place is in the division of the course from three terms of 18 weeks each to two annual terms.

All new students hereafter admitted must enter in September.

The course for the degree of Graduate in Pharmacy will hereafter consist of two annual sessions, beginning about September 23 and ending about April 15, each session embracing twenty-five weeks of active instruction, exclusive of the usual holiday recesses, registration days, examinations and other college functions which, strictly speaking, do not constitute instruction.

The course for the degree of Pharmaceutical Chemist will consist as before of two years of nine months each, terminating in the second or third week of June.

All students who devote their whole time to their school work will receive thirty hours' instruction, requiring their attendance five full days weekly.

Students who are unable to attend college without the opportunity to engage in concurrent drug store work in order to earn a material part of their expenses will be assisted to find employment at wages sufficient to pay at least their living expenses. A special time-card has been worked out for their benefit, which will enable them conveniently to take all of the work embraced in the course by attending the college about twenty-three hours weekly from September to June each year for two years. The school work is exactly the same, both in kind and amount, as that given to those students who give their whole time to their studies. The rates for tuition will be the same for all students.

THE SUREST ROAD TO SUCCESS IN THE DRUG BUSINESS.

The most valuable and the only distinctive feature of the retail drug business is the pharmaceutical work connected with it. This accounts for the present widespread and vigorous effort to bring physicians and pharmacists into more rational and just relations to each other in order to secure the best service to the community by rehabilitating technical-professional pharmacy.

The immediate special agitation has for its object an effective propaganda of the solid value and reliability of the medicinal preparations of the U. S. Pharmacopœia and the National Formulary. Physicians have found that those preparations are clearly their main reliance and that the products protected by patents, copyrights or secrecy can have no special virtues since they must necessarily contain the remedies mentioned by the best authorities, which are freely accessible to all. The only remarkable thing about the proprietary preparations is the fact that advertising could have gained for them such an enormous consumption before it was realized that their makers do not possess any valuable exclusive knowledge and that the claims made for many of those nostrums are not only extravagant or absurd, but in several notorious instances fraudulent.

Now the physicians propose to return to the Pharmacopœia and the National Formulary and to direct their own combinations of remedies, and medicines prepared by pharmacists will be given the right of way and a fair trial.

This movement is sensible, ethical and for the best interests of the public.

Pharmacists should, however, fully realize that success depends upon their ability to respond to the requirements of the medical profession in the most satisfactory and efficient manner. The coming generation of pharmacists must be thoroughly trained for that purpose. They should take the most substantial practical college courses in pharmacy within their reach, for in these days of strenuous commercial drug business they will find it quite impossible to acquire the necessary knowledge, skill and practical experience in drug stores. No amount of drug store experience can possibly equal a well-balanced and well conducted college course, embracing from 1,000 to 1,500 hours of practical laboratory work under the direction of experienced teachers.

Every student taking the course for the degree of Graduate in Pharmacy at Northwestern University receives a thorough grounding in all branches taught and works at the laboratory tables twenty hours weekly through two college years of six months each. Every student taking that course makes about 170 finished pharmaceutical and chemical preparations, largely consisting of those ordered in the Pharmacopœia and National Formulary, and receives such training that he can successfully do any and all such work. Every such student receives in addition 100 hours of laboratory drill in compounding prescriptions under the direction of a practical dispenser who has had more than twenty years of the most active and varied experience in some of the largest pharmacies of Chicago, and all the work done in that course is carefully selected and planned so as to cover all phases of compounding and dispensing.

Every student taking the course for the degree of Pharmaceutical Chemist receives over 500 hours of additional practical training to prepare him for the enlarged duties which will be required of the pharmacist of the immediate future.

PHARMACOPOEIAL AND NATIONAL FORMULARY PREPARATIONS.

An exhibit of preparations of the Pharmacopœia and the National Formulary made by students in the laboratories of the School of Pharmacy of Northwestern University in the regular course of instruction for the degree of Graduate in Pharmacy will be completed during this college year and will then be ready for inspection by all who are interested.

Speciments of more than a hundred pharmaceutical and chemical preparations made by the students are already on exhibition at this School.

THE OLD AND THE NEW METHOD OF PRACTICAL TRAINING IN PHARMACY.

The old method of training young men for pharmacy in our country was through the drug store apprenticeship exclusively. It was, of course, successful whenever the employer-preceptor was of the right sort, but a failure whenever the employer was ill trained or an unfit or unwilling teacher. Years of apprenticeship and experience were necessary in any case to accomplish satisfactory results, even when the preceptor was good and the apprentice himself bright, enthusiastic and a student.

Later, lecture courses were established by colleges of pharmacy so that apothecaries' apprentices and clerks could have the advantage of a definite curriculum and instruction given by competent teachers. But the manual training and actual practice continued for a long time to be confined to the drug store. The colleges of pharmacy either had no laboratories or found it impracticable to make laboratory courses obligatory.

The next step was the introduction of laboratory work in the colleges. But "Rome was not built in a day." Twenty-five years passed before extended laboratory instruction became general even in the best schools. To-day, however, any prospective student of pharmacy who is wise enough to investigate for himself can easily find a school where the laboratory work included in the regular course of instruction is of substantial value both in quantity and character. One year in such a school is worth more than several years' practical experience in the average drug store of to-day, for the laboratory practice in such a school is systematically planned and is carried to completion under the most favorable conditions possible.

Board of Pharmacy examinations invariably and necessarily include chemistry, pharmacy and materia medica. These subjects are not taught in the drug store, nor is the apprentice or clerk given any time for study there. Moreover, the task of acquiring a sufficient knowledge of them is hopeless without due system, good teachers, and, above all, abundant laboratory practice.

The average druggist of to-day says he does not have time to fool with any attempt to teach his apprentices and clerks anything except the purely commercial routine. That being the case where and how is the druggist to get competent assistants unless the schools can solve that problem?

Occasionally a so-called "practical druggist," who is so hopelessly unpractical that he cannot see and will not admit that college courses in pharmacy, with laboratory work included, must be far more valuable than drug store instruction, expresses the opinion that college courses are only "theoretical" and that the teachers in the schools of pharmacy are not practical pharmacists. Such a man usually thinks that he is himself thoroughly practical, never suspecting that if he had only had the advantage of education in a good school of pharmacy he would surely be a still more practical pharmacist. He has no conception of the meaning of the word "practical."

The faculty of the School of Pharmacy of Northwestern University has one teacher who has been actively engaged in pharmaceutical work for forty-six years, who completed a four years' apprenticeship in one of the busiest pharmacies in Europe and has had over nine years in active retail drug business in the United States; another who began his apprenticeship in Europe twenty-eight years ago, served five years there, and has had at least eight years' active experience in America; a third member of the faculty has given thirty-eight years to pharmacy, of which twenty years were devoted to the retail drug business; a fourth member has had twenty-one years' of the most active retail drug store experience; a fifth teacher began his practical connection with pharmacy eighteen years ago and has given six years of that time to the work in a retail drug store. Two other members of the faculty have also had several years' practical experience in drug stores. All these men are university graduates with but one exception. Several of them are well known in pharmaceutical circles. All of them keep in touch with current progress. The instructor in dispensing gives a portion of his time to active retail drug business still. Practical pharmacists who have had good education and extended experience as teachers can, with the aid of the facilities provided by a well-equipped school, give much more effective practical instruction than any drug store. No drug store will afford any apprentice or clerk the opportunity to manufacture 170 different finished representative pharmaceutical preparations in two years, or, for that matter, in any number of years. No reasonable man who knows enough about drug stores and pharmacy schools to be entitled to the belief that his opinion is of any value will dispute the fact that a systematic laboratory course in dispensing, accompanied by lectures and including the actual dispensing of over 400 chosen prescriptions as lessons, must be more effective and valuable than the instruction now obtainable in any drug store.

There is ample reason for the undisputed fact that drug store experience is a necessary part of the training of a pharmacist. No one knows that better than the practical specialists who compose the faculty of a good school of pharmacy. But the value of the drug store experience depends upon the fact that seasoned reliability can be gained only by sufficient practice under that sense of responsibility which actual service at the dispensing table carries with it.

The *education* of pharmacists must henceforth be obtained at the schools or colleges of pharmacy. It cannot be effectively given anywhere else. The necessary *practice,* of course, must always be completed in the drug store.

PHARMACISTS ARE WELL PAID.

The demand for competent and reliable drug clerks is altogether unprecedented. Graduates of this School are offered from $100 to $150 per month, and there are not enough of them to fill the positions open to them. Good character and sufficient practical experience are required, but graduation from a first-class practical training school is quite as necessary, because it is at last becoming more and more evident to employers that the drug-store training of to-day is wholly inadequate. Eight graduates of this School are asked for by one single state on the Pacific coast this month.

THE VALUE OF LABORATORY TRAINING.

All of the courses of instruction in a good school of pharmacy are valuable; but the most telling instruction of all is the laboratory work. The nature of pharmacy is such that laboratory methods and practice are absolutely indispensable to adequate practical education for it. But laboratories and laboratory courses are the most costly feature of a school of pharmacy. This accounts for the fact that the laboratory work given in the colleges varies all the way from two hours to over twenty hours weekly, and that the average is less than ten hours weekly. Lectures can be delivered to five hundred persons at a time and in a room comparatively inexpensively furnished. But laboratory courses call for costly equipments of furniture, fixtures, apparatus and materials, and the undivided services of several teachers, while at the same time the classes must in any laboratory be limited to the number that can be provided for and effectively instructed.

Three full days (or twenty hours) weekly should be devoted to laboratory work in any course of the usual length, and the students should not only have the usual amount of instruction in chemistry and pharmacognosy, but should prepare a sufficient variety of pharmaceutical preparations and dispense hundreds of prescriptions. The value of this work more than justifies its great cost.

Considering the character and quantity of its courses of instruction the tuition fees in the School of Pharmacy of Northwestern University are exceptionally low.

PRIZES FOR EXCELLENCE IN SCHOLARSHIP.

Two memberships in the American Pharmaceutical Association are awarded as prizes to graduates at the time of graduation—one to a Graduate in Pharmacy, and the other to a Pharmaceutical Chemist. These awards will be made in April and June each year by vote of the Faculty and will be based upon general excellence in college work and in deportment. Certificates of merit will accompany these awards. Membership in the American Pharmaceutical Association is valuable and honorable, and when awarded by an educational institution as an acknowledgment of merit it is an exceptional distinction.

OF INTEREST TO STUDENTS.

Students who have already attended the School one or more semesters will, of course, have the opportunity to finish their course on the old plan, provided they do not delay entering beyond the year 1907-1908.

CREDITS GIVEN BY THE STATE BOARDS FOR EDUCATION FOR PHARMACY.

The following declarations were adopted by the American Pharmaceutical Association, the Joint Conference of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties at Indianapolis in September, 1906:

"Special education for the practice of pharmacy is in this age a necessity and should as rapidly as possible be made compulsory, and the rules of the Boards of Pharmacy should be such as to promote and encourage it in all practicable ways.

"The special pharmaceutical education required should include substantial laboratory courses."

"A preliminary general education of not less than one year's satisfactorily completed high school work, or its educational equivalent, should be a prerequisite to the pharmaceutical experience or apprenticeship required for the licensing of registered pharmacists and assistant pharmacists and for admission to pharmaceutical schools."

"We recommend to all concerned that the foregoing principles and standards be adhered to in any amendments to the pharmacy laws hereafter proposed, in order that national uniformity may be ultimately attained. The minimum requirements indicated, and especially the preliminary general education, should be increased from time to time as circumstances permit. We further strongly urge that the Boards of Pharmacy employ the discretionary powers already theirs under existing laws to improve the educational status of the pharmacists of the future."

The interest prospective students of pharmacy have in the pharmacy laws and regulations already in force may be summarized as follows:

Students who think it at all likely that their future career may lead them to the states of New York or Pennsylvania should be careful to attend some one of the pharmaceutical schools recognized by the authorities of those states. All of these schools, so recognized, are required to make one year's high school training the prerequisite for admission and to conduct courses of instruction in accordance with the standards prescribed.

Students who, after graduation, expect to practice in other states where more or less credit is given for college courses should be careful to attend colleges that are in good standing in such states.

Those who intend to take up their lifework in Wisconsin, Iowa, Kansas or Michigan should not fail to take a full two years' course, occupying eight or nine months of solid work in each year, as prescribed in those commonwealths. The course for the degree of Pharmaceutical Chemist given in this School fulfills all requirements everywhere.

Students from those states whose laws or board rulings do not at present require or recognize any special education in pharmacy should nevertheless heed the signs of the times and begin right. The time is ripe for improvements in pharmaceutical legislation, and the state that to-day offers practically no legal bar to the practice of this calling by the unfit, may to-morrow lead all the rest in the enactment of wise restrictions for the proper protection of the public, in limiting the practice of pharmacy to specially educated and trained pharmacists, and in giving ample recognition to those who have properly prepared themselves for the responsibilities that attend the compounding of physicians' prescriptions.

The states of *New York* and *Pennsylvania* require graduation from approved pharmaceutical schools as a prerequisite to license. (Northwestern Ph.G. course.)

The Board of Pharmacy of *Wisconsin* requires of all applicants for license as Registered Pharmacists a total of five years' training, of which not less than two years must be given to special education in approved pharmaceutical schools and not less than two years to practical experience in drug stores, while the fifth year may be either college attendance or shop training. Registered Assistant Pharmacists in Wisconsin must have two years' training, one year in a drug store and one in an approved school of pharmacy.

The year in a school of pharmacy must be not less than thirty-two weeks, and all schools of pharmacy holding membership in the American Conference of Pharmaceutical Faculties are recognized by the Wisconsin State Board of Pharmacy if their courses cover two annual sessions of not less than thirty-two weeks each. [Northwestern Ph.C. course.]

In the state of *Iowa* the new pharmacy law exempts all graduates of approved pharmaceutical schools from the drug-store experience prescribed for registration in other cases, provided said graduates have taken courses occupying two annual sessions of not less than thirty-six weeks each. [Northwestern Ph.C. course.]

The *Michigan* law demands a preliminary education equivalent to two years' high school work. Four years' drug-store experience is required for the licensing of Registered Pharmacists, except that graduates of approved pharmaceutical schools if they have had two full years of study, occupying not less than nine months each year, with not less than fifteen hours' laboratory work and ten hours of other instruction weekly, may be registered upon proving two years' drug-store experience. [Northwestern Ph.C. course.]
Two years' drug-store experience is required of assistant pharmacists, who in Michigan are styled Registered Druggists; but candidates for license in that grade are given one year's credit for one full academic year of study at an approved school of pharmacy giving not less than 15 hours' laboratory work and 10 hours of other instruction weekly through nine months. The Michigan law explicitly provides that no credit shall be given for any partial, fragmentary, unfinished or unsuccessful college courses. This explicit proviso is rendered necessary by the common practice in other states of allowing credit

for the time of attendance at colleges of pharmacy without any inquiry in regard to its value or completion.

In *Kansas* the graduates of approved pharmaceutical schools, if they have completed a two years' course, with thirty-one weeks' school work each year, consisting of not less than 15 hours' laboratory work and 10 hours of other instruction, are exempt from the Board examination. This substantial encouragement of systematic education for pharmacy is in the highest degree commendable. [Northwestern Ph.C. course.]

In *Arizona* all graduates of "legally constituted" colleges of pharmacy are entitled to registration without examination, provided they have had four years' drug-store experience. Others are examined.

In *Georgia* graduates of pharmacy are not required to prove any drug-store experience. Others must have three years' experience.

The new *Indiana* law exempts graduates from examination.

In *Indian Territory* the graduates of schools which are members of the American Conference of Pharmaceutical Faculties are exempt from examination and are registered if they have had two years' drug-store experience. Other applicants for license must show three years' experience and pass the examination.

Maine registers graduates without drug-store experience. Others must have four years of such practice.

In *Minnesota* four years' drug-store experience is required for the licensing of Registered Pharmacists, except in the case of graduates of schools of pharmacy giving courses of instruction which include "not less than twelve months' laboratory work." Such graduates are entitled to a reduction of two years from the shop experience mentioned. [Northwestern Ph.G course.]

Graduates of approved schools of pharmacy are entitled to registration in *Nevada* without examination. All others are examined.

Ohio deducts from the drug-store experience the time of attendance at approved pharmaceutical schools. The time credited is the actual resident attendance plus one-third, but not to exceed two years for the grade of

Registered Pharmacist and one and one-half years for the grade of Assistant Pharmacist. Candidates who have not attended approved pharmacy schools must prove four years' drug-store experience for the higher grade of license and two years for the Assistant grade.

In *South Carolina* the graduates of approved pharmacy schools are exempt from examination, and the time of their college attendance is deducted from the three years' drug-store experience required of non-graduates.

South Dakota requires three years' drug-store experience for the licensing of Registered Pharmacists, and one year of Assistant Pharmacists; but graduates of approved schools receive a credit of two years on that "experience."

Texas registers graduates without examination if they have had two years' experience.

Wyoming registers graduates of approved pharmacy schools without examination.

Actual time of attendance at approved schools of pharmacy is deducted from the prescribed drug-store experience in: *District of Columbia, Florida, Illinois, Montana, Nebraska, New Jersey, North Carolina, North Dakota* and *Tennessee.*

Alabama, Arkansas, Delaware, Missouri, Oklahoma and *West Virginia* are now the only states that register without examination only the graduates of colleges that still continue to require drug-store experience for graduation. Northwestern University School of Pharmacy, in common with other university schools, ceased many years ago to try to perform this duty of the Boards of Pharmacy, and the requirement is out of date and leads to no good result. Few schools now require it for all degrees.

In other states no credit is given for systematic education in pharmacy, but the advantage graduates have over non-graduates in those states lies in the fact that their chances of passing proper examinations are better.

When it is remembered that no educational requirements for pharmacy existed a few years ago we may hope for more rapid improvement and progress in the future.

A NEW AND ATTRACTIVE OCCUPATION FOR PHARMACEUTICAL CHEMISTS.

The demand for chemists to do the work required under the new national and state food and drugs acts is so great that it probably cannot be met for several years. The chief of the Bureau of Chemistry at Washington is quoted as saying that the national government cannot secure one-tenth of the number of men required, and the state and municipal governments will, of course, have the same experience. Already seventeen states have passed pure food and drugs laws along the line of the federal act. The manufacturers, too, will find the employment of food and drugs chemists necessary.

Young men and women who think they would like the occupation of examiners of food and drugs ("drugs" as defined in the law means all kinds of medicines) may in two years prepare themselves for the work referred to. The positions in this service are very remunerative, but it is useless to aspire to such appointments without adequate preparatory training.

So large a proportion of the work to be done consists of the examination of medicinal substances that a thorough course of pharmaceutical college education is imperatively necessary. Such a course as given in the School of Pharmacy of Northwestern University for the degree of Pharmaceutical Chemist affords that training.

Several of our graduates have already passed the civil service examinations for these positions.

The following is an extract from a communication written by Dr. H. W. Wiley, Chief of the Bureau of Chemistry, to the Sunday Record-Herald of Chicago, March 31, 1907: "It was not until the day before Christmas that the act appropriating $250,000 for the enforcement of the law for the remaining portion of the fiscal year—that is, until July 1, 1907—made this sum available. It was necessary, after this appropriation bill was signed, to apply to the civil service commission for examinations for inspectors and chemists. The commission will hold in the near future an examination for inspectors at salaries of $2,000 and lower grades in the service, for experienced chemists at salaries of $3,000 and lower grades in the service, and for younger chemists at salaries of $2,000 and lower grades in the service. The Secretary of Agriculture has asked for an appropriation of $750,000 for the fiscal year beginning July 1, 1907, to be applied in the enforcement of the food and drugs act.

"It is probable that the chemical service will not be concentrated in Washington, but will be distributed to various parts of the country. It is possible that several new laboratories will be established, especially for the inspection of imported goods."

SPECIAL POST GRADUATE COURSE FOR FOOD AND DRUGS CHEMISTS AND INSPECTORS.

A thorough and practical course of training for efficient service under the recently enacted Food and Drugs Law of the United States, and under state and municipal laws of similar character, is offered by the School of Pharmacy of Northwestern University.

The course for the degree of Pharmaceutical Chemist, occupying two years of nine months each, is just such a course. But, in addition, a post-graduate course is offered to graduates of this and other schools in good standing who have had the necessary preliminary work in chemistry and other branches, so as to be prepared to finish this special course in one additional school year of six months. Graduates who have had two years' courses, embracing at least fifty weeks, with not less than twelve hundred hours' instruction in pharmacy, chemistry and pharmacognosy, will be admitted to this course. This course is offered in response to the many inquiries received from graduates in pharmacy and others who desire to fit themselves for positions in national, state and municipal laboratories or for similar positions in the laboratories of manufacturers and wholesale establishments.

The rapidly extending demand for better protection of the public, and of reputable manufacturers of and dealers in food and drugs, has opened up a wide and promising field of activity for those who fitly prepare themselves. The character of this work is such that sufficient practical training for it naturally falls within the province of the best-equipped pharmaceutical schools.

This course has been most carefully arranged so as to be in every detail fully adapted to the requirements of the National Bureau of Chemistry and to the practical work demanded.

The subjects included are as follows:

1. Laboratory course in Inorganic Analysis. Practical work in general and special processes employed for the determination of the composition of inorganic substances by gravimetric methods.
Nine hours weekly through twelve weeks.
Professor Gordin and Mr. Harrison.

2. Lectures on chemical physics including the use of the polariscope and other physical instruments in chemical work.
Lectures on alkaloids, glucosides and other important natural constituents of drugs; their character, composition, separation, identification and quantitative determination.
Lectures on the chemistry of the organic synthetic compounds employed in medicine.
Two hours weekly through twenty weeks.
Professor Gordin.

3. Important Unofficial Products and Preparations (not contained in the Pharmacopœia of the United States).
Two lectures weekly through five weeks.
Professor Oldberg.

4. Laboratory course in the preparation of organic chemical compounds, such as ethers, chloroform, iodoform, nitrobenzene, acetanilide and various other organic substances used in medicine, and the production of a number of important natural plant substances, such as glucosides and other neutral principles, volatile oils, alkaloids, etc. Nine hours weekly through twelve weeks.
Assistant Professor Miner.

5. Pharmaceutical Testing. Practice in the quantitative estimation of drugs and preparations containing alkaloids, and the examination of volatile oils and various other pharmaceutical and industrial products. Practice in the determination of melting points and boiling points. Toxicological examinations. Other laboratory methods employed in similar work.
Twelve hours' laboratory work weekly through twelve weeks with accompanying lectures.
Assistant Professor Patterson.

6. Food and Sanitary Analysis. The examination of common food products and of water, milk, butter, fats and oils, baking powders, beverages, flavoring extracts, sugars and syrups, candies, ice-cream, etc. The analysis of water to determine its potableness and its fitness for household use.

Twelve hours of laboratory practice weekly through thirteen weeks with accompanying lectures and recitations.

ASSISTANT PROFESSOR PATTERSON.

7. Laboratory course in Commercial and Sanitary Microscopy. Examination of powdered drugs, spices, starches, foodstuffs, hairs, textile fibers, etc.

Nine hours weekly through thirteen weeks.

DR. JENSEN.

8. Bacteriology. The work usually required for sanitary purposes.

Nine hours weekly through thirteen weeks.

ASSISTANT PROFESSOR WILLARD.

The time card of instruction will be so arranged that those who require or desire to review Organic Chemistry may attend the full lecture course on that subject, occupying five hours weekly from September to February, without additional charge. This review is recommended.

Students who have completed these courses and who fulfill all other requirements may receive the degree of Pharmaceutical Chemist.

The total tuition fee, including materials, for this special post-graduate course is $120. A laboratory deposit of $10 is required to cover breakage.

THE SUMMER SCHOOL.

A Summer School Term of about six weeks' work is offered to special students. This year it begins June 12th. Lecture courses are not given in this term, but such laboratory work only as may be advantageously done. Pharmacists—graduates and non-graduates—who may desire to take one or more of the laboratory courses offered may do from twelve to thirty-six hours' work weekly. The courses given are: Qualitative Analysis, Quantitative Analysis (Volumetric and Gravimetric), Pharmaceutical Testing, Urine Analysis, Botany, Pharmacognosy, Commercial Microscopy, Pharmaceutical and Chemical Preparations (in the general Pharmaceutical Laboratory), and Dispensing.

Information regarding hours, fees, etc., will be furnished upon application.

Students who wish to review one or two of the regular courses may do so conveniently in the Summer Term.

SUMMARY OF THE COURSES OF INSTRUCTION.

The courses for the degree of Graduate in Pharmacy require the attendance of the student during fifty-two weeks, exclusive of the Christmas recess. The fifty-two weeks are divided equally between two years.

The courses for the degree of Pharmaceutical Chemist occupy seventy-two weeks—nine months each year for two years.

The amount of instruction embraced in the course for the degree of Graduate in Pharmacy is 1,500 hours, of which 1,000 hours are devoted to practical laboratory work.

The more advanced courses for the degree of Pharmaceutical Chemist aggregate 2,100 hours.

All of the work included in the courses of instruction for the degrees conferred in this School is most carefully adapted to the special requirements of pharmacists. This practical adaptation of the courses to the occupation of pharmacy is rendered more effective by the fact that so great a number of the members of the faculty have themselves had extended and varied experience in that profession, and that their entire time is given to their educational work in this School.

The important basis of the courses is the Pharmacopœia.

In the manufacturing laboratory each student makes 170 finished preparations. Specimens of the products made by the students are set aside every year, which conclusively demonstrate the high grade of skill which they attain through the practical courses in this School.

The classes are drilled with especial care in all that pertains to the crowning function of all pharmacy—the best possible technical service to the public and the medical profession at the dispensing table.

It is the ambition of the Faculty of this School to make it in every way the most efficient practical training school for pharmacists.

COURSES FOR THE DEGREE OF GRADUATE IN PHARMACY

A. DEPARTMENT OF THEORY AND PRACTICE OF PHARMACY.

The time devoted to instruction in this department includes 275 hours for lectures and recitations and 400 hours for laboratory work; total, 675 hours.

1. *Weights and Measures and Pharmaceutical Arithmetic.*—The metric system and the customary weights and measures. Specific gravity. Actual practice in the computation of doses, the making, mixing and dilution of solutions and mixtures, standardization, percentage solutions, etc. Calculations of proportions, and other necessary arithmetical problems connected with practical pharmaceutical and chemical work. Two hours weekly during twenty-five weeks. MR. GEORGE D. OGLESBY.

2. *General Preparatory Course on the Materials* employed in the preparation of medicines. Study of the general pharmaceutical properties of the most important constituents of vegetable drugs, such as cellulose, starch, pectin, mucilage, albumin, fixed oils and fats, volatile oils, resins, tannin, bitter principles, glucosides, alkaloids, etc. These several classes of drug constituents are reviewed sufficiently to render the practical study of pharmaceutical processes intelligent and effective. About eighteen lectures.

PROFESSOR OLDBERG.

3. *General Pharmaceutical Processes and Manipulations,* such as powdering, solution, filtration, evaporation, crystallization, precipitation, sublimation, distillation, maceration, digestion, percolation, dialysis, etc. About sixteen lectures and recitations.

MR. GEORGE D. OGLESBY.

4. *Preparatory Laboratory Course,* familiarizing the student with apparatus, processes and materials. This course of practice in chemical and pharmaceutical operations, includes the making of many pharmaceutical preparations.

Two laboratory periods weekly, of three hours each, during twenty-five weeks. ASST. PROF. MAURICE A. MINER.

5. *Review of all Classes of Pharmaceutical Preparations* not made by chemical processes, such as powders, triturations, masses, troches, tablets, pills, capsules, ointments, cerates, plasters, suppositories, waters, mucilages, syrups, emulsions, mixtures, infusions, decoctions, tinctures, wines, fluid extracts, extracts, oleoresins, resins. General methods of preparation.

About forty lectures and recitations. PROFESSOR OLDBERG.

6. *The Pharmacopœia of the United States.*—Its general character, scope and functions, and its technical nomenclature.

About eighteen lectures and recitations.

PROFESSOR OLDBERG.

As the Pharmacopœia is the most important of all books to the pharmacist, and the established legal standard by which all medicinal substances enumerated in it must be judged, it is used as a general guide in all departments of study in this School, especially in pharmacy, pharmacognosy, pharmaceutical testing and drug assaying.

Every student is expected to own and become familiar with this law book of the apothecary.

7. *The Chemical Pharmaceutical Preparations.*—Applied inorganic pharmaceutical chemistry. The basic principles and the most important methods applicable to the preparation of inorganic pharmaceutical chemicals and preparations, and their practical pharmacy.

About thirty-four lectures and recitations.

Professor Oldberg.

8. *Laboratory Practice in Manufacturing Inorganic Chemical-Pharmaceutical Preparations.*—A great variety of examples are presented, and the students are thereby made familiar with the character and properties of the substances classed as the inorganic pharmaceutical chemicals by the most effective method possible.

Two laboratory periods weekly of three hours each for twenty-five weeks. Asst. Prof. Maurice A. Miner.

9. *The Practical Pharmacy of Individual Organic Drugs.*—The pharmaceutical character, chemical constituents and preparations of all important vegetable drugs. The individual extracts, fluid extracts, tinctures and other preparations.

About thirty-four lectures and recitations.

Professor Oldberg.

10. *The Prescription Department.*—The character and construction of prescriptions. How to read and interpret them. Detection of defects, errors and incompatibilities. The dispensing department and its practical problems. About sixteen lectures and recitations. Professor Oldberg.

11. *Duties and Responsibilities of Pharmacists.*—Laws governing their technical professional work, and the sale of drugs and poisons. The relations of pharmacists to the medical profession and to the community. Ethics. About sixteen lectures and recitations. Professor Oldberg.

12. *The Art of Dispensing.*—A practical laboratory course, with accompanying lectures and recitations. It is now generally conceded that a systematic course of laboratory training in the art of making extemporaneous pharmaceutical preparations and in compounding and dispensing medicines must be a fundamental and crowning feature of any first-class school of Pharmacy. In the Dispensing Laboratory of the School of Pharmacy of Northwestern University (the first workshop of its kind) the student sees and learns to use an outfit of dispensing apparatus many times as extensive as can be found in many of the best drug stores together.

Every student is required to make a great variety of extemporaneous preparations. The lessons are systematically prepared or selected with the view to include all important phases of work at the dispensing table with all kinds of materials and by all the different methods practiced. A practical experimental study of incompatibilities is included in this course.

Over 400 different instructive prescriptions are prepared by each student in this laboratory.

About sixteen lectures and one hundred hours of laboratory drill. MR. GEORGE D. OGLESBY.

13. *Commercial Pharmacy.*—The miscellaneous supplies legitimately furnished by modern pharmacies, such as unofficial medicinal preparations and products; surgical instruments, bandages, dressings, plasters, etc.; sanitary and dietetic and other sick-room supplies, including antiseptics and disinfectants; and other similar articles which the medical profession and the public expect all first-class pharmacies to furnish.

These lines of goods, including specialties, are described and shown to the classes, ample exhibits being provided at the School for that purpose.

Samples of the finished products of pharmaceutical manufacturers, such as coated pills, capsules, troches, fluid and solid extracts, elixirs, and other classes of preparations are also exhibited and discussed.

The object of this course is to familiarize the student, as far as possible, with the supplies of this kind which he must handle as a pharmacist and about which he must be well enough informed to perform that duty intelligently.

About sixteen lectures. MR. GEORGE D. OGLESBY.

14. *Business Training.*—A course of class exercises and practice designed to teach the student how the most common and essential commercial affairs connected with the drug business are conducted, including bookkeeping. Students are taught the nature and uses of invoices, bills, statements, orders, receipts, the banking business of the druggist, bills receivable and payable, drafts, notes, checks; they learn something of the meaning and uses of pricelists and discounts, credits, collections, remittances, consignments, taking stock, partnership, commission, insurance, interest, taxes, contracts, leases, bills of sale, etc.

About sixteen hours. MR. ERNEST WOOLLETT.

B.—DEPARTMENT OF GENERAL INORGANIC, ORGANIC AND ANALYTICAL CHEMISTRY.

The instruction hours in the courses for the degree of Graduate in Pharmacy are, in this department, 150 hours given to lectures and recitations and 375 hours to laboratory work; total, 525 hours.

1. *General and Inorganic Chemistry.*—Theoretical and practical chemistry, including inorganic qualitative and quantitative

analysis, with especial reference to the needs of the pharmacist in the intelligent interpretation and application of the text and tests of the Pharmacopœia.

Three hours weekly of lectures and recitations and 225 hours laboratory work.

PROFESSOR GORDIN AND MR. WILLIAM H. HARRISON.

2. *Organic Chemistry.*—A course sufficient to enable the student to understand the text of the Pharmacopœia in describing organic compounds and to perform intelligently the tests and assay methods prescribed in it.

Seventy-five lectures and recitations through twenty-five weeks.

PROFESSOR GORDIN.

3. *Drug Assaying and Organic Pharmaceutical Testing.*—Pharmacopœial processes of valuation and standardization of the most important drugs and preparations, such as opium, cinchona, nux vomica, etc., etc.

Practice in the application of the purity tests prescribed in the Pharmacopœia, and in the quantitative examination of important chemical preparations by the official methods. The determination of alcohol in tinctures, fluid extracts, and other alcoholic preparations, and the valuation of pepsin, pancreatin, diastase preparations, etc.

Two laboratory periods weekly of three hours each through twenty-five weeks. ASST. PROF. CHARLES W. PATTERSON.

C. DEPARTMENT OF BOTANY, MICROSCOPY AND PHARMACOGNOSY.

The instruction embraces 25 lectures and 200 hours of laboratory work; total, 225 hours.

1. *Pharmaceutical Botany.*—The organs, tissues and microscopical structure of plants and plant drugs—a necessary prepartion for the study of vegetable drugs.

One lecture and four hours' laboratory work weekly through twenty-five weeks. DR. GERHARD H. JENSEN.

2. *Pharmacognosy.*—Study of the vegetable drugs and their powders, with especial reference to the intelligent interpretation of the descriptions given in the Pharmacopœia for the identification of such drugs and to enable the student to learn to judge correctly of their quality.

Four hours laboratory work weekly, with lectures; twenty-five weeks. DR. GERHARD H. JENSEN.

D. DEPARTMENT OF PHYSIOLOGY AND MATERIA MEDICA.

Total, 100 lectures.

1. *Physiology.*—A course intended to sufficiently prepare the student for the course in Materia Medica, or Pharmacology.

Fifty lectures through twenty-five weeks.

ASST. PROFESSOR HARRY KAHN.

2. *Materia Medica.*—The properties, action, uses and doses of official drugs, including so much of therapeutics and toxicology as is indispensable to the safe practice of pharmacy.

Fifty lectures through twenty-five weeks.

PROFESSOR HARRY KAHN.

ADDITIONAL COURSES FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.

All of the courses of instruction included in the curriculum prescribed for the degree of Graduate in Pharmacy constitute a part (two-thirds) of the curriculum for the higher degree of Pharmaceutical Chemist. The courses for the degree of Graduate in Pharmacy begin in September and end in April of each year. Students who are candidates for the degree of pharmaceutical Chemist may take the additional work during the remaining months of the two school years, from April to June.

The whole curriculum comprises over 2,100 hours of obligatory work, of which over 1,500 hours are devoted to the laboratory courses.

The additional work included in the regular curriculum for this degree is as follows:

THE LAST TWO MONTHS OF THE FIRST YEAR.

1. *Quantitative Analysis, Chiefly Gravimetric.*—The laboratory course begins with the simple fundamental operations characteristic of the general method, and proceeds to the special processes involved in the actual gravimetric determination of inorganic substances.

Twelve hours weekly through eight weeks.

PROFESSOR GORDIN AND MR. HARRISON.

2. *Advanced Pharmaceutical Testing.*—Practice in the separation, identification and estimation of alkaloids. Further work in the official methods of assaying drugs and preparations. The examination of organic substances for the detection of impurities and adulterations. Practical study of methods of taking melting points and boiling points. Quantitative estimations of certain solutions and preparations, such as formaldehyde, etc.

Twelve hours weekly through eight weeks, with accompanying lectures. ASSISTANT PROFESSOR PATTERSON.

3. *Commercial Microscopy.*—A course designed to afford the requisite training for the duties of the Pharmaceutical Chemist and Public Microscopist, including the examination of powdered drugs, spices, foodstuffs, etc. Specially prepared cross and longitudinal

sections of whole specimens are supplied for comparison with the tissue elements as found in powders. A thorough study of the various kinds of starch is made. Hairs and textile fibers are studied. Training is given in microtechnique, including micrometry and work with the camera lucida and polariscope. Special methods for the isolation and determination of the structural elements of woods, stems, leaves, barks, roots, rhizomes, seeds, fruits, glands and spores.

Nine hours weekly through eight weeks. DR. JENSEN.

4. *The Pharmacopœias of the World.*—Comparative study of the pharmacopœias of the world, their scope, style of construction, materia medica, chemistry, pharmacy, nomenclature, preparations and other important features.

Important Unofficial Medicinal Products and Preparations not included in the Pharmacopœia of the United States.

Two lectures weekly. PROFESSOR OLDBERG.

THE LAST TWO MONTHS OF THE SECOND YEAR.

1. *Special Course on Alkaloids, Glucosides, Etc.*—A course of about eighteen lectures upon the alkaloids, glucosides and other definite chemical compounds contained in drugs and other plant substances. Their composition, separation, identification, properties and relationships.

Chemical Physics.—The use of the polariscope and other instruments in chemical work.

The Synthetic Compounds now employed in medicine.

Five lectures weekly. PROFESSOR GORDIN.

2. *Laboratory Practice* in the Preparation of Organic, Pharmaceutical and Chemical Preparations.

The production of natural plant substances, such as alkaloids and glucosides, and of the more common organic chemical preparations. Among the products made are, for instance, salicin, piperin, aloin, amygdalin, berberine, ether, chloroform, iodoform, acetic ether, nitrous ether, methyl salicylate, acetanilide, etc.

Nine hours weekly. ASSISTANT PROFESSOR MINER.

3. *Food and Sanitary Analysis.*—The examination of water to determine its potableness and fitness for household uses and the examination of milk, butter, cheese, beverages, and food products generally, and such other work as is usually required of public analysts for sanitary purposes.

Twelve hours weekly in the laboratory with accompanying lectures. ASSISTANT PROFESSOR PATTERSON.

4. *Urine Analysis, Qualitative and Quantitative.*—The detection and determination of constituents of urine, which are of importance in the diagnosis of disease.

Twelve hours weekly.

ASSISTANT PROFESSOR PATTERSON AND MR. HARRISON.

THE SCHOOL OF PHARMACY OF NORTHWESTERN UNIVERSITY.

THE UNIVERSITY was chartered by the state of Illinois in 1851. In 1905-06 its degree conferring departments had 2,560 students and its other schools 1,303, making a total of 3,863.

THE SCHOOL OF PHARMACY was established in 1886. Its average annual attendance for the past six years, including 1906-07, has been 225. From 20 to 25 states are annually represented in the classes.

It is located in NORTHWESTERN UNIVERSITY BUILDING, in the heart of Chicago, corner of Lake and Dearborn streets, easily accessible from any part of the city. The School of Pharmacy occupies the entire fourth floor, 160x180 feet.

The EQUIPMENT of the School is worth over $25,000 (1907), not including the quarters occupied by it.

The LABORATORIES are six. They are for the exclusive use of the pharmacy students, have a total floor space of 9,570 square feet, and are provided with 292 individual work tables, enabling that number of students to be all at work at one time. The *qualitative chemical laboratory* has a floor space of 1,800 square feet; the *quantitative chemical laboratory* 1,450 square feet; the *organic chemical laboratory* 1,900 square feet; the *laboratory for botany and pharmacognosy* 1,224 square feet; the *pharmaceutical manufacturing laboratory* 2,300 square feet; and the *dispensing laboratory* 900 square feet.

SEVERAL laboratories of other departments of the University are, in addition, open to the students of pharmacy.

The LECTURE ROOMS are two, one seating 182, the other 90.

The STUDENTS' ROOMS are two—one for men and one for women.

The MUSEUM contains over 2,000 specimens, including all kinds of drugs, manufactured pharmaceuticals, sick-room supplies, and other articles usually furnished by up-to-date, first-class pharmacies.

The LIBRARY occupies about 1,000 feet of floor space, and contains the most valuable reference works, worth about $3,700.

The FACULTY includes ten teachers and assistants, of whom eight have had practical experience in pharmacy. These teachers, with but one exception, give all their time and attention to their work in this School, having no other occupation and no other classes.

A FULL PROGRAM OF INSTRUCTION is given, carefully prepared with the view to occupy the student's time to his best advantage.

LABORATORY WORK, which is the most important feature of modern pharmaceutical education, constitutes about two-thirds of the total hours of instruction.

COURSE FOR THE DEGREE OF PH. G.—This occupies a total of 52 weeks, embracing over 500 hours of lectures and recitations and over 1,000 hours of laboratory work.

COURSE FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.—This requires nine months' work in each of two years, or four semesters. The instruction amounts to about 540 hours of lectures and recitations, and over 1,500 hours' laboratory work.

ADMISSION REQUIREMENTS.—One year's satisfactorily completed high school work, or its full educational equivalent, is required for admission to the course for the degree of Graduate in Pharmacy.

This is now required by law or by the rules of the Boards of Pharmacy in several states.

Students are not admitted under 17 years of age.

The only state of the United States which has a law fixing the minimum of preliminary general education for admission to the schools of pharmacy (New York) prescribes these requirements, and graduates of colleges, which do not require at least one year's high school work, have no standing in that state.

The same requirements have been adopted for the future by the National Association of Pharmacy Schools, the American Conference of Pharmaceutical Faculties, including twenty-six colleges, among which are nearly all of those founded prior to 1890, and all members of that association, with but two exceptions are fulfilling those requirements now.

Of the students who entered Northwestern University School of Pharmacy during the past twelve months, one had a Bachelor's degree, 3 per cent. had had two or more years' college work, 40 per cent. were high school graduates, 20 per cent. had completed three years' work in high schools, 13 per cent. had completed 2 years, and 23 per cent. one year's high school work.

No school of pharmacy now requires more than one year's high school work for admission to the course leading to the degree of Graduate in Pharmacy, but higher requirements may be confidently expected at an early day.

The preliminary general education required for admission to the course leading to the degree of Pharmaceutical Chemist is two years' completed high school work, or its equivalent.

Positions for Graduates.—The demand for graduates of this School to occupy good positions is at all times greater than the supply. For some years past every graduate has been engaged before graduation day.

A registry is kept at the college office of positions open to graduates, and employers desiring competent men are invited to address their inquiries to this School.

The occupations open to the alumni include: The drug business, wholesale and retail; professional pharmacy; positions as pharmacists in the Army and Navy and the Public Health and Marine-Hospital Service; hospital pharmacists; work as commercial and sanitary public analysts, and in the establishments of manufacturing pharmacists and chemists.

The demand for pharmaceutical and sanitary chemists in the service of the national government under the new pure food and drugs act is ten times greater than the supply.

Over twenty of the alumni have become teachers in pharmaceutical and medical schools.

Northwestern University School of Pharmacy is a member of the American Conference of Pharmaceutical Faculties, and is recognized in all states where any standards of efficiency have been established by law or by the Boards of Pharmacy.

FEES AND EXPENSES.

Fees for the course leading to the degree of Graduate in Pharmacy.

FIRST YEAR.		SECOND YEAR.	
Matriculation	$ 5.00	Laboratory Deposit	$ 15.00
Laboratory Deposit	15.00	Tuition and Materials	100.00
Tuition and Materials	100.00	Diploma Fee	10.00
Total	$120.00	Total	$125.00

Fees for the Course leading to the degree of Pharmaceutical Chemist.

FIRST YEAR.		SECOND YEAR.	
Matriculation	$ 5.00	Laboratory Deposit	$ 20.00
Laboratory Deposit	20.00	Tuition and materials	140.00
Tuition and Materials	140.00	Diploma Fee	10.00
Total	$165.00	Total	$170.00

Certain indispensable articles (not materials consumed) are necessarily furnished by the school for the convenience of students and to render the work effective and orderly. These articles include for example, note books, drawing books, dissecting needles for use in the microscopical laboratory, aprons and sleeves, additional pieces of apparatus required to replace those broken or lost, etc. A coupon ticket to the amount of $5.00 is used for the purpose of procuring these articles as needed. Supplies of this kind are issued in no other way. Unused coupons are redeemed at the end of the year or whenever the student discontinues his attendance.

No tuition or other fees are refunded except in case of the student's illness. In that case, if the student presents a certificate from a physician that he is unable to remain in attendance, and a statement from the Dean of the School that he is in good standing, one-half of the current semester's fees will be refunded, provided application is made before the middle of the semester.

BOARD AND ROOM.—Good board and room together can be secured near the School at from $4 to $6 per week. Students may also secure rooms and board separately. Information in regard to these matters and addresses of reliable and satisfactory private boarding places and furnished rooms will be supplied at the College. Good accommodations are plentiful, and satisfactory arrangements can be quickly made by each student immediately upon his arrival.

Students who are strangers to the city are, if desired, met upon their arrival and given every courtesy by the Northwestern University School of Pharmacy Secretary of the Y. M. C. A. and his aids, who have permanent offices in Northwestern University Building.

For further information address the Dean of

The School of Pharmacy, Northwestern University Building,
87 Lake Street, Chicago.

GRADUATES — MARCH, 1906, TO MARCH, 1907.

Degree of Master of Pharmacy.

Gsell, Earl Wilson........Illinois

Degree of Pharmaceutical Chemist.

Foster, Frank Homer........Iowa
Hansen, George Conrad...Illinois
Hitchcock, Francis Elliott........ Michigan
Holmes, Clifford J...........Iowa
Huard George Napoleon...Illinois
Huss, Franklin C..........Illinois
Klatt, Albert ....Illinois
Lord, Frederic William...Illinois
Rushton, George Lord.....Illinois
Seyfert, Carl Reber..........Ohio
Timson, Charles Eldred...Illinois
Timson, Samuel G.........Illinois
Virchow, John Emil, Jr...Illinois

Degree of Graduate in Pharmacy.

Alexander, Oscar Henry..Indiana
Bachelle, Percy V.........Illinois
Baughman, Leo Melzer........... South Dakota
Bensend, Floren B.....Wisconsin
Bergstresser, E. Ray............. South Dakota
Brearton, Martin Redmond....... Illinois
Brown, Arthur Edmond...Illinois
Brown, Howard Creswell..Illinois
Cavitt, Rivers C........Kentucky
Chilcote, Roy Waters..Wisconsin
Collins, John Stephen.....Illinois
Danielson, Carl Rudolph.....Iowa
Davis, Mark Albert...Washington
Fahrner, Alphonse Anthony...... Illinois
Fosselmann, William C.....Iowa
Graham, Harry Day...Wisconsin
Hauth, Henry Frederick....Iowa
Heitmann, Frederick William.... Illinois
Hershey, Guy F...........Illinois
Hess, J. Earl...............Iowa
Hitchcock, Francis Elliott........ Michigan
Hodson, Daniel Francis..Michigan
Hughes. Herbert Henry......... Montana
Jericho, Warren B...........Iowa
Johnson, Magnus G....Minnesota
Jordan, Wm. Francis.....Illinois
Jorns, Gustave C.......Wisconsin
Kassulke, August Erich Hugo... Indiana
Keller, Cornelius Baker...Illinois
Lees, Robert Fay..........Illinois
Leonard, Guy R........Wisconsin
Levy, Milton D...........Illinois
Linder, Walter Henry....Illinois
Martin, Frank William....Illinois
Metzger, Arthur Shuh....Illinois
Nitardy, Ferdinand William...... Minnesota
Nordling, Albert Josephus........ Illinois
Norling, Roy Arthur.......Illinois
Ohming, Harry W........Indiana
Parker, Lloyd W........Nebraska
Payne, Wyndham Randolph...... Iowa
Petry, Herbert Arthur.....Illinois
Pettersen, Ella Henrietta..Illinois
Raeth, Joseph Philip......Illinois
Rex, Clarence R.............Ohio
Rice, Ivan S................Idaho
Rigney, Charles....South Dakota
Rink, Lester Lee..........Illinois
Rozanski, Boleslaus Joseph...... Wisconsin
Ruggles, Frederic Gilworth...... Illinois
Rushton, George Lord....Illinois
Schmitt, George John A..Illinois
Schmitz, Herbert George....Iowa
Schneider, Carl Henry....Illinois
Schneider, Joseph Christian..... Iowa
Seyfert, Carl Reber..........Ohio
Shimerda, Edward F............ South Dakota
Spater, William C...........Iowa
Staib, Herman Frederick..Illinois
Stone, Richard ....Wisconsin
Sweet, Earl Edmund......Illinois
Timson, Charles E........Illinois
Veaco, Sidney H.......California
Wilkinson, Barclay......Alabama
Wilson, Charles Frazee...Indiana
Wray, Daniel D.............Iowa

MATRICULATES.

Students who are in the first year's work are designated by the number 1; those in the second year's work by the number 2.

CANDIDATES FOR THE DEGREE OF PHARMACEUTICAL CHEMIST.

Benensohn, Samuel, 2.....Illinois
Bergen, Roy M., 2.........Illinois
Blomenkamp, William, 1......... Nebraska
Brecht, Paul A., 1................ South Dakota
Brody, Hyman Louis, 1...Illinois
Caris, James M., 1.........Iowa
Clark, Raymond E., 1.....Illinois
Clay, James Lewis, 2......Illinois
Cooper, William Cortlandt, 2..... Illinois
Eicher, Benjamin L., 1...Illinois
Foley, John J., 1............Iowa
Gaffney, Randolph E., 1...Illinois
Geahart, A. F., 1.........Illinois
Gregory, Matthew R., 1...Illinois
Crulke, Oscar, 1.............Iowa
Haessler, Loren M., 2.......Iowa
Harris, Holly P., 1..........Iowa
Henson, Claude E., 1......Illinois
Hitchcock, Francis Elliott, 2.... Michigan
Holmes, Clifford J., 2.......Iowa
Hynek, Charles M., 1.....Illinois
Jentz, William J., 1.......Illinois
John, Clinton Walter, 2......... Nebraska
Jones, Fred C., 1........Colorado
Leonard, Eugene O., 1.....Idaho
Long, Walter Eugene, 2...Illinois
Lowell, Chester Reuben, 2........ Illinois
Markham, Roy W., 1...Wisconsin
McDonald, Mary Angela, 2........ Illinois
McMaster, William Warren, 1... Illinois
Metzger, Arthur Shuh, 2......... Illinois
Mills, Harry B., 1.........Illinois
Minnick, Fred 2.........Nebraska
Pease, Robert W., 1.......Illinois
Peters, Otto R., 1...........Utah
Pettyjohn, Charles 1......Illinois
Potter, Herschel Edwards, 2..... Arkansas
Powell, Monte L., 1.......Illinois
Proudfoot, Alfred C., 1...Illinois
Reid, Arthur Peter, 2.....Illinois
Rink, Lester Lee, 2.......Illinois
Rex, Clarence, 2............Ohio
Steinbach, Isabel R., 1.....Illinois
Taylor, Milo C., 1.........Illinois
Terry, Clifford H., 1......Illinois
Timson, Charles Eldred, 2........ Illinois
Walker, George Henry, 2..Illinois
Wolff, Dell Henry, 2...Wisconsin

CANDIDATES FOR THE DEGREE OF GRADUATE IN PHARMACY.

Alexander, Oscar Henry, 2....... Indiana
Arado, John G. A., 2......Illinois
Arganbright, George, 2......Iowa
Askew, Joseph William, 2........ Illinois
Baughman, Leo Melzer, 2........ South Dakota
*Becker, Gustav ....
Boyer, Alden Scott, 1.......Iowa
Brennan, William J., 2......Iowa
Brearton, Martin Redmond, 2.... Illinois
Brown, Arthur Edmond, 2........ Illinois
Brown, Howard Creswell, 2...... Illinois
Buchholz, Edwin Alfred, 2...... North Dakota
Calvert, Edgar S., Jr., 1......... Illinois
Carlson, Julius L. N., 1....Illinois
Chilcote, Roy Waters, 2.......... Wisconsin
Claypool, William Edward, 2..... Illinois
Collins, John Stephen, 2...Illinois
Crawford, John A., 1.....Indiana
Danielson, Carl Rudolph, 2..Iowa
Davis, Orel T., 2...........Illinois
Druehl, Hugo William, 2......... Colorado
Duffy, Herman H., 1......Indiana
Dunn, James Francis, 1...Illinois
Dvorak, J. T., 1........Minnesota
Eichler, Albert G., 1......Illinois
Eyer, Edith, 1............Illinois
Fahrner, Alphonse Anthony, 2... Illinois
Ferguson, O. E., 1........Illinois
Frank, William, 2.........Illinois
Freeman, Elmer Jonathan, 1..... Illinois

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* Did not attend.

Candidates for the Degree of Graduate in Pharmacy —Continued.

*Fritsch, Cassimir.................
Gehrke, William, 2.....Wisconsin
Gemmell, David J., 2......Illinois
Hauth, Henry F., 2..........Iowa
Hess, J. Earl, 2..............Iowa
Hille, J. James, 1...........Texas
Hitchcock, Francis Elliott, 2..... Michigan
Hodson, Daniel Francis, 2........ Michigan
Horn, Walter S., 1......Michigan
Howard, George, 1........Illinois
Hughes, Herbert Henry, 2....... Montana
Jenkins, William Cook, 2......... Kentucky
Jericho, Warren B., 2.......Iowa
Johnson, Louis E., 1.....Illinois
*Johnson, Carl...................
Jordan, William Francis, 2....... Illinois
Jusajtus, John M., 1......Illinois
Kaempfer, Robert, 2...Nebraska
Kelsheimer, Ralph I., 1...Illinois
*Kelly, William Henry...........
Kempf, Fred F., 2...........Iowa
Lamm, Albert H., 2...Minnesota
Lees, Robert Fay, 2........Illinois
Leisten, Anthony William, 2..... Colorado
Leonard, Guy Raymond, 2....... Wisconsin
Levy, Milton D., 2........Illinois
Lienhardt, Theodore G., 1....... Illinois
Link, Emery Randolph, 1..Illinois
Lucas, Edward Charles, 2........ Missouri
Martin, Frank W., 2......Illinois
Matthaei, Paul, 2.........Illinois
McQuillen, Henry Patrick, 2..... Illinois
Nitardy, Ferdinand William, 2... Minnesota
Nixon, Miss Linnie E., 1...Illinois
Norling, Roy Arthur, 2...Illinois
Ohming, Harry William, 2........ Indiana
O'Neal, Ernest, 1..........Illinois
Paesler, Gustav Charles, 2....... Illinois
Paine, G. Stewart, 1........Illinois
Parker, Delson J., 2......Illinois
Payne, Wyndham Randolph, 2.... Iowa
Raeth, Joseph Philip, 2...Illinois
Ragland, F. W., 1.........Illinois
Raithel, Henry, 1.....New Mexico
Ramsey, Paul Houston, 2....Ohio
Ricks, William, 1...........Idaho
Rigney, Charles, 2..South Dakota
Rizor, Alexander, 1.......Greece
Ross, Arthur D., 1..South Dakota
Rozanski, Boleslaw Joseph, 2.... Illinois
Russell, Adelbert W., 2.......... Wisconsin
Rutledge, W. O., 1....Mississippi
Schmitz, Herbert George, 2...... Iowa
Schneider, Carl Henry, 2..Illinois
Schneider, Joseph C., 2.....Iowa
Schulze, William C., 1..Wisconsin
Seaver, Herbert Keith, 2....... North Dakota
Seeley, Wm. Hansel, 2...Indiana
Smith, J. Francis, 1.....Missouri
Smith, Rex G., 2.........Illinois
Stewart, Fred Henry, 2.....Iowa
Strickland, F. Cecil, 2....Illinois
Sutton, Robert Henderson, 2...... Idaho
Sweet, Earl Edmund, 2.......... Illinois
Switzer, Emmet B., 1......Illinois
Taylor, Samuel, 1...North Dakota
Thompson, John E., 2........... North Dakota
Thompson, Raymond M., 1...... Illinois
Thorsen, Alfred N., 1....Illinois
Uhlmann, Edward Henry, 2..... Illinois
Wagner, Harold Harvey, 2..Ohio
Walker, Warren N., 1........... South Dakota
Watkins, Miss Axie D., 2..Illinois
Wernicke, Louis, 1........Illinois
Wilkinson, Barclay, 2...Alabama
Wilson, Charles F., 2.....Indiana
Wire, Leslie H., 1........Illinois
Woolf, Jacob C., 2.........Illinois
Zea, John W., 2...........Illinois
Zeller, A. H., 2............Illinois

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*Did not attend.

SPECIAL STUDENTS.

Allegretti, John, 1........Illinois
Craig, George P., 1........Illinois
Cranshorn, David C., 1...Indiana
Doggett, Lucy...... ....Illinois
Hynes, J. A.................. Illinois
Kehoe, John C., 1........Illinois
Miller, Edward, 1..........Illinois
Ross, E. J., 1...................Illinois
Shirley, Cecil G., 1........Indiana
Trunk, Robert L., 1.......Illinois

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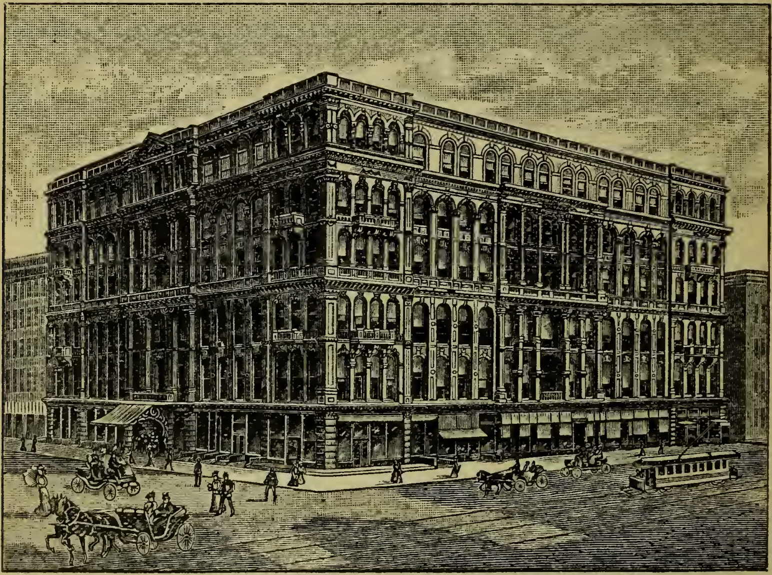

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